INTERVIEWING ANIMALS

By Dr. Bastian Schmid

By Dr F. S. S. Buytendijk

THE MIND OF THE DOG

"It combines both the affectionate regard of the animal-lover with the precision and caution of the scientist. . . . His writing is always of a quite rare lucidity and this, together with his sympathetic knowledge, has produced a really excellent book."—*Time and Tide*

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by

DR. BASTIAN SCHMID

With 57 photographs
and 5 diagrams

Translated by

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INTRODUCTION

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If we want to make the acquaintance of an animal we must not pass it by as we should pass a tree or a milestone; nor will it be enough to concern ourselves with its form and its movements, though these will often delight and astonish us; nor shall we learn all we want to know by capturing the animal and keeping it in confinement, in order to study some particular characteristic—observing, for example, its reaction to stimuli, or some other point of behaviour. By such means we may, of course, learn much that is valuable, but we shall not really be getting to know the animal. For those who really want to make the acquaintance of an animal must be for ever seeking and making discoveries; and since they are endeavouring to obtain a revelation of the animal's soul they will often feel that they are in the creature's debt, in so far as the animal has anything to give, and they are able to understand it.

I seem to have made the personal acquaintance of many animals, and not only those which have been mentioned in this book. As far as they were able, they opened their hearts to me, allowing me glimpses of their character, and a few of their special peculiarities. And this is saying a good deal, for, after all, every species has its psychic stamp or style. Sometimes we are confronted by individualities—even by personalities. The character of the

animal is innate, and it does not undergo any fundamental changes, but it has to be unveiled. For the animal unconsciously conceals itself from us, and is perfectly justified in doing so. But when for once in a way it does reveal itself we are astonished by the depths of its nature. The animal's soul is a strange little soul, boundless in its urges and desires, and yet unexacting, making few claims upon its restricted environment.

I have written this book for all those who feel drawn to animals, and I could wish that more and more would truly make their acquaintance.

With two exceptions, all the illustrations are reproductions of my own photographs.

BASTIAN SCHMID

MÜNCHEN-SOLLN
July 1935

INTERVIEWING ANIMALS

I

HOW I CAME TO STUDY ANIMALS

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My own acquaintance with animals dates far back into my childhood. All around me were fowls, ducks, geese, turkeys, pigeons, chickens, and again chickens. In the cowshed were lambs, and cows with their calves; and at the close of a hot day in harvest-time I was allowed to ride the old grey horse to the water. That suited us both. He swam, and swam, and his little rider found his swimming a much gentler and more comfortable mode of progression than his jog-trot along the uneven road.

In early spring, the best breeding-season for our hens and other birds, there were often as many as six or more hens sitting at a time. I was allowed to help in looking after them; every day I had to lift the broody hens off the nest, and give them their food and water, and from the twelfth day onwards I had to turn the eggs, in case the hen should fail to do so of herself; and finally I had to keep an occasional eye on the chicks as they pecked and ran to and fro. Most of these mothers would allow me without question to take one of their chicks in my hands and breathe on it. The chicks would struggle resolutely to reach the source of warmth, and would try to wriggle into my mouth, but they

were quite contented if I put them into my coat sleeve, whence they could creep to warmer regions.

It so happened that in a little market-town I once saw some remarkably tall yellow fowls with feathered feet. They were standing in the little front garden of a tiny cottage, and by reason of their tallness they made an overwhelming impression upon me. Immediately I was overcome by the longing that I myself might possess at least one cock and three or four hens. Thanks to the circumstance that I had brought a considerable proportion of my savings with me, I had soon struck a bargain with their owner. Hitherto I had merely regarded hens with affection, but now I began to be exacting as regards their appearance. Henceforth they must be handsome, if not actually imposing. My cock could take a piece of bread from the table if he stood on his toes and stretched his neck. His hens laid big brown eggs, and one of them even rejoiced my heart with eight chickens.

Sometimes on my walks I passed the country house of Baroness S——, and there I saw fowls that were even handsomer than my yellow Cochins. They had black plumage and white crests. Longingly absorbed in the contemplation of these birds, I stood before the tall railings, with the final result that I could think of nothing but my desire to possess such birds. But this seemed to me a hopeless aspiration. After all, the lady of the *Schloss* had no need to sell her hens, like the humble individual of whom I had bought mine. But my luck was in, for as chance would have it she happened to pass the gates with her maid, and she asked me what

I wanted. This gave me courage to express my desire in a practical form, and to say that I had some fine Cochins at home, but I liked her birds much better; I would give her eggs or even chickens in exchange for her "top-knots," and even a few more than I would ask of her. The lady agreed, smiling, and so the bargain was struck. A child of eight, I knew nothing of breeds and crosses, and in those days even the countryfolk hardly bothered themselves about such things; at all events, not in connection with poultry. I, however, as was natural at my age, was delighted by the appearance of all sorts of crosses; as when Cochins with white crests made their appearance, and crested fowls with feathered feet. But the mixtures of colouring were less to my taste. My views were shared by Dr. M——, a friend of my father's, and a neighbour; however, he offered me some speckled hens in exchange. In this way our poultry-yard became more and more variegated, and the new cocks crowed with a deeper voice, and were always quarrelling with the old ones. There was always something new to be seen when I came home for the holidays.

Geese I liked even better than hens. We got on very well together. They played with my shoe-laces and buttons, and at the proper season I provided them with chopped nettles. I preferred them even to the ducks. The little goslings have a softer and more musical voice, and their habit is quieter than that of the rather restless and roving ducks, although individual ducks can be extraordinarily docile.

My world extended far beyond the house and the farm, to the regions where our various winter

pensioners had their home: the squirrels, jackdaws, magpies, jays, carrion crows, and a number of lesser birds. There was no season of the year at which some particular bird or animal did not impress itself upon me, and many things which I was to understand only long afterwards must in those days have formed a sort of complex in my mind. And so it happens that even to-day I can call up freshly-remembered pictures of situations and events, which are fully confirmed by subsequent investigation—that is, by systematic observation.

Even to-day I can plainly see before me the open fields where the brown furrows gleamed in the spring, and the crows tripped along behind the plough, picking out the white cockchafer grubs, or now and again hacking at a fat mole-cricket, while the larks rejoiced in the sky. I loved the morning smell of the freshly-turned earth, and the dew on the fields of wheat and clover, and the scent of the honey-filled flowers from which the drowsy bumble-bees were hanging.—Swallows came to fetch the sticky clay from the edges of the puddles, collecting material for future nests; starlings, glistening in the sun, chattered in front of their cottages; finches trilled and warbled, and the pied woodpecker could be heard tapping in the tall pear-tree; the cuckoo called, and if I listened to him carefully I knew precisely where he was, in the top of a birch-tree on the fringe of the forest. I knew of numbers of hidden birds'-nests, but I held my own counsel about them, and that was just as well for the future broods. In the meadows a couple of fish-ponds were glittering; they looked like a pair of great eyes.

On the broad leaves of the water-lilies plump frogs were squatting, and others here and there were croaking. At night the pulsing rhythm of their chorus was continued until all hours. It often drew me to these deep, silent waters. Then there were the whirligig-beetles to watch, whose dances set up gentle ripples on the sunlit water; there were grass-snakes that moved effortlessly across the green mirror, always intent on their prey; and dragon-flies with glistening, transparent wings, and other delightful creatures. The yellow-bordered Diving Beetle (Cybister) floated up, took a silver ball of air under its wings, and slowly disappeared with it into the depths. Sometimes a surprisingly large beetle appeared. For a long while I did not know its name; it was the *Dytiscus latissimus*, as I learned some years later.

Then it was summer; and the air quivered above the hot earth. From the clover-fields the fat bear-caterpillars wriggled across the roads. Butterflies—Swallow-tails, Purple Emperors, and Peacocks—fluttered above the fragrant blossoms; in the gardens the Cabbage and Wood Whites were hovering. The young swallows were already cutting curves round the church tower. Up in the tower kestrels had their nest, and in the shadowy roof of the nave a pair of owls lived in dark secrecy. But only one bird was feared by our feathered folk of the farmyard, and that was the goshawk, which would dash boldly at the scattering flock. Also his cousin, the sparrow-hawk, was no less audacious. Once he followed an excitedly squawking sparrow into my bedroom, and seized him just above the

flue of the stove. And once I caught a young short-eared owl in my father's study. She grew very tame, and lived nine years with us. Although she never threatened to do the chickens any harm, all the hens were very hostile to her.

In the cornfield the foxes crept right up to the farm-houses, and could boast of rich booty. Once a badger passed me without seeing me. I had the sense to stand perfectly still, as I had seen the keepers do in such cases. In the warm nights I heard the quail calling, a curiously rhythmical tinkle. I do not know why it was that this particular bird should have drawn my thoughts so strongly to Egypt, since I had learned that many other birds flew thither in autumn.

The rain came inland, and everywhere one could hear the threshers at work. Now one could see little coveys of partridges. And now the cock pheasants, already adult, went gleaning in the stubble. Punctually on the second of September hare-shooting began. I always learned a great deal from the huntsmen and the beaters; but much of it did not please me, for I was too fond of the hares.

Autumn drew on. The cows were in the meadows; the starlings rode, as in the spring, on the backs of the sheep, and along the telegraph-wires were unbroken lines of swallows. Quieter and quieter grew the evenings. The bats, even when twilight came, remained hanging behind the shutters of the windows. Only a little owl, attracted by the light of the candles, now and then brushed the window-pane with his wings. In November the fish-ponds were drained. Two keepers made their

appearance, for there had been some talk of an otter. Indeed, one could still see the entrance and exit of his holt, but he had already disappeared. When the surface had sunk so low that the dark backs of the fat carp became visible, and long-sought pike the length of a man's arm leapt out of the water, the frogs also took alarm. A great concourse of living things was huddled together in this emergency, friends and foes cheek by jowl. One of the great pike was taken in a strong net; he had a smaller brother in his mouth, and he again had a roach in his.

The first snowflakes came whirling earthwards, and the circle of living things grew constantly narrower. Yellow-hammers flew along the roads after the teams of horses. On the snow-covered fields sat the ruffled, hungry crows, flying up into the air, sinking down again, and finally gathering about the corpse of a frozen leveret, on which hardly anything was left to nibble. In the forest the foxes barked. The pump was long since frozen, and in its delivery-pipe a cole-tit roosted at night.— The only really lively creature, far and near, was the kingfisher, who was always busy about the brook, which never froze completely, however hard the winter, and usually harboured small roach. At our bird-table were forgathered almost all the birds to be found in our immediate neighbourhood, from the wren and the crested lark to the jay and the nutcracker and other Corvidae.

These were the seasonal landscapes of my home. But for me the centre of interest was always the living creature.

2

HOW CHICKENS COME INTO THE WORLD

★

A BROODY hen is set on a clutch of eggs, apparently just in time. She has already shown signs of her condition: that is, she has moulted on either side of the lower part of her body, as is usual at this period. Since these now naked parts are richly supplied with blood-vessels, the full warmth of the body can be transmitted to the eggs.

It is curious to note how the psychology of the animal is affected by such physical changes and the appearance of new functions. The hen's whole *character* has altered. If you approach the nest she emits peculiar and hitherto unaccustomed sounds, which are something between a screech and a caw. If you try to take hold of her these cries become more and more urgent, and even as you approach her she ruffles up all her feathers. If you lift her out of the nest she will usually offer resistance, which she never did while she was laying. If you set her down she runs excitedly round and round, and immediately begins to cluck. Her whole behaviour, including her cries, is characteristic of the brood-hen, as is the fact that her life, during the brooding period, is full of deprivations, and it is only at our instigation that she takes food and water from time to time.

Is this behaviour due to a conscious maternal attitude, or is it merely the result of the brooding instinct? The hen broods on china nest-eggs exactly as she does on real eggs; she will sit for weeks on balls, stones, and other objects; indeed, she will brood in an empty nest. In other words, she *must* sit and give out heat until she has passed through the brooding period. These sober facts rob the brood-hen of her maternal glamour, and she seems to us, in her aimless persistence in sitting on stones or imitation eggs, or even on nothing at all, a particularly stupid creature. Yet in this respect she does not stand alone. After all, we have seen swallows brooding on broken eggs and seagulls on heaps of snail-shells.

Such cases as this, in which we perceive, so to speak, the purely formal operation of the brooding instinct, may, on the whole, be rare exceptions. But it remains a fact that the bird "sits" instinctively, and not as a result of conscious deliberation; and herein lies the deeper significance of the process. Behind the unknown components of instinctive behaviour there is still something hidden. If we prefer, we may count the maternal principle among the mysteries of the world-process which our intellect will never succeed in penetrating.

One and twenty days the brooding hen must sit upon the fertilized eggs before the chickens emerge. During these three weeks the little creatures have to pass through the whole process of development. Each organic system unfolds itself in perfect harmony with all the rest. The intestines and the lungs, the heart, with all its blood-vessels, the kidneys,

with their ureters, the skeleton, the muscles, the nervous system, the organs of sense, and so forth. Yes, even the plumage already makes its appearance, though at first only in the form of a covering of down.

It is the twentieth day of the brooding period. Our chicken is tapping at its shell, and struggling to escape from its prison. Fortunately it has grown an egg-tooth, which for that matter is not a tooth in the ordinary sense of the word, but merely a horny prolongation of the point of the beak, which disappears after the bird has left the egg. But for the moment our little bird has need of this tool, or it would be in danger of suffocation.

If you listen attentively for the first movements of the chick in the egg, you will hear not only a tapping, but also a gentle chirping. This is just like the cheeping of the chicks during the first few weeks of their life after hatching. By this they are either expressing a general physical discomfort or they are announcing that they are hungry. The mother-bird answers, according to circumstances, with a call-note, or one of her other parts of speech.

And how does the brooding hen react to the cheeping in the egg? How does she converse with the child which hitherto she has never seen, and cannot see now? She responds with a muted call-note.

According to my own observations, even at this stage a sort of correspondence is established between the two: on the one side, that of the child, there is a request, and on the other a reassuring answer.

In many cases I have heard the hen, if startled by a sound or the sight of an unfamiliar face, utter a warning cry, at which the chicken became perfectly silent for the moment.

In some other species of bird the dialogue between mother and child assumes an even livelier form. Not only does the cheeping of the chick in the egg suddenly cease at the mother's cry of warning, but the little bird is silent until a different sound from its mother's throat tells it that the danger has passed, whereupon they both continue the conversation.

But let us return to our chickens. The process of hatching may sometimes continue for as long as four, six, or eight hours, including various pauses for rest. In especially difficult cases I have helped the little bird to emerge, cautiously removing any obstacles, as, for example, bits of shell which have stuck to its plumage. But unskilful handling may easily tear the delicate vessels of the skin, and cause bleeding, when the chick will immediately utter a loud note of pain. When at last the hatching is complete the little creature must be dried, like any other newly-born, warm-blooded animal.

It might perhaps be assumed that the difficulties of hatching affect only our domestic chickens, and are in some degree a sign of degeneracy. This is not the case. Other birds also have to fight their way into the world, as the following example will show. It was in the Tihany Institute for Biological Research, in Hungary, beside the great Plattensee (Lake Balaton), where I often hatched herons,

ibises, seagulls, wild ducks, etc., etc., in an incubator. I was able to make the most complete observations of the whole process in the case of two young ibises, as they were hatched during the day. Even before they began to peck at their shells the little creatures uttered a sound which was quite familiar to me: the very characteristic note which denotes fear or anxiety or the desire to escape by flight, and which is often heard during the first few months of the bird's life. This sound is a very distinct "ĭ."

Between the first pecking of the shell, the first sight of the tiny bill, and the lifting of the top of the eggshell, which in the meantime had been cracked in four places, about five hours elapsed. At 11.0 o'clock things became very lively, as the chick managed to free its left wing from the shell. It now humped its back and moved to and fro, rhythmically bumping itself against the shell. It looked as though it were struggling with its bonds. After about an hour of such violent movements, accompanied by very audible quacking sounds, the little bird had worked its way out. But as with our chickens, its wings were still adhering to the membrane lining the shell. And now it was obviously becoming fatigued.

The little creature rested until 4.0 o'clock in the afternoon, when, having completely rid itself of the last remnants of the eggshell, it began to creep about its warm bed.

By no means all birds find the business of hatching so difficult. The divers and the crested grebe are especially quick at it. In their case there is only

a short pause between the first pecking at the shell and creeping out of it, for it might otherwise happen that water would find its way into the egg and drown the young bird.

In the life-history of our domestic chicken (and of the little ibis) we have so far been impressed by *three* wellnigh miraculous facts. One concerns the awakening life, one the instinct to liberate itself from the egg, and the third is the cheeping of the unborn chick.

Eminent zoologists have carefully studied the development of the chicken, and have published their results, in full detail, illustrating them by the most carefully accurate drawings and photographs, in volumes of great scientific value.

But none of them can tell us *how* the chicken comes to life. Of course, the ovum and the sperm-cell were alive before they merged into a single cell in the act of fertilization, and life was manifest in all the phases of the egg's development. The tiny embryo absorbs nutriment and oxygen, and grows towards maturity, thanks to these vital necessities and the warmth of the mother-bird's body. The oxygen of the atmosphere reaches the chicken through the large pores of the shell. If you were to coat the egg with varnish or some other impermeable substance the life in the egg would be stifled. Nutriment is supplied to the growing embryo even in the hen's body, even before the soft and the hard egg-shells have come into existence. These two envelopes are formed around the germ-disk later on, in the ovary; round the yellow yolk as well as the so-called white, or albumen. After this

has happened the embryo can receive no further nutriment from outside; it has now been allotted its due supplies of nutriment and building-materials.

Even more wonderful than the inherently insoluble problem of the beginning of life is the first craving for movement, or, in other words, the tiny creature's impulse to liberate itself. Anyone who has studied the egg up to the emergence of the chicken can already convince himself of the functioning of individual organs: they are all attuned to one another, interacting like the wheels of a clock, each adjusted for its own task; the intestines already contain some digested albumen, and when the chicken's bowels are first moved, almost before it has emerged from the shell, the droppings date from the period before its birth.

But now comes the greatest moment in the chicken's life: it begins to move, to tap against the shell, and to cheep. It is now not only alive; it has mentally awakened. When did it wake? That we do not know. But that it is awake is plainly evident, and also that its psychic manifestations are something quite distinct from mere physical existence. Similarly, the circulation of the blood, respiration, the digestion of food in the intestines, or the secretion of the kidneys is something quite different from a purely psychical event. When the materialistic naturalist Carl Vogt said "that thought stands in much the same relation to the brain as bile to the liver or urine to the kidneys"—in other words, that the brain excretes ideas and other psychic products as the kidneys excrete urine—he was making a tremendous mistake. The psychical is invisible and

inaccessible to chemical analysis or physical proof and measurement. On the other hand, we know all about the function and the working of the kidneys. Further, the chemical composition of urine has been determined with impeccable accuracy. More than a century ago the Göttingen chemist Wöhler succeeded in producing synthetic urea.— Our chicken gives expression to its emotions even in the egg, and, as we shall presently see, it begins to *learn* and accumulate experience in the first few days of its life. Is it not remarkable how such a tiny bird sets us all thinking?

It is a warm spring day. The brood-hen has successfully hatched out a dozen chickens, and has gathered them around her. The tiny, cheeping creatures have been offered a meal of minced egg. They are already pecking here and there, now at their own toes, or the little drops of water adhering to them, and now at the ground, but they cannot yet pick anything up. The mother bird is uneasy; she clucks excitedly, and finally she herself pecks at the fragments of egg, with shrill, enticing call-notes. Taking a morsel in her beak, she lets it fall again, in order to encourage her little ones to help themselves. In other words, she is teaching them how to eat. She cannot put tit-bits into her children's beaks, as the parents of herons, hawks, wood-peckers, crows, and song-birds are able to do. Domestic fowls, ducks, geese, and other so-called *autophagous* (self-feeding) birds cannot feed their offspring. Only the *insessorial* (nest-sitting) birds are able to feed them. But like these, the brood-hen to a great extent deprives herself of food for the sake

of her little ones, and surrenders every morsel which she finds to her children.

Our chickens learn very quickly. A few of their pecks are badly aimed, and strike the ground beside the egg-crumb; but then the morsel is seized with the greatest accuracy. *Pecking* and *seizing* has become a natural action. No young sparrow-hawk can peck and seize his food, to say nothing of the sparrow or the raven, which are blind at this age; and least of all the human child, for it is weeks before he learns to grasp a desired object. He cannot rightly estimate distance, and his fingers are not yet obedient.

Our brood-hen now goes walking in the garden with her chickens, anxiously watching over every one of them. They are now three days old; they peck at all sorts of insects, seize little earth-worms, scatter in all directions, and already betray a certain longing for independence. Now and again the eagerly calling mother has great difficulty in bringing them all together again. But for the fact that they have to warm themselves from time to time she would be much less concerned about them. —There overhead a hawk is hovering. The mother-bird has already caught sight of it, and in the same moment her *warning call* is heard. Although the chickens have never yet heard this particular sound, they react to it instinctively and immediately. Some of them even repeat this call in their own fashion, according to the situation at the moment. Those nearest to their mother hasten to take refuge under her wings; others crouch in some little depression in the ground; a few have hidden them-

Plate 1. Squacco Heron chick, 1½ days old, 2½ inches in length, compared with an unfertilized egg from the same clutch.

Plate 2. The 4-day-old artificially incubated chickens have not the least fear of the snake, even when it creeps between them.

Plate 3. There is always something unreal and goblin-like about young herons.– Two 6-day-old Night Herons (*left*) and one 8-day-old Common Heron (*right*).

selves under the leaves of a cabbage. All is silent. The chickens have obeyed one of their instincts.—In the meantime the bandit has taken himself off, and now the mother-bird emits a series of tenderly enticing notes, at which all the chicks who are not already beside her come hurrying up. And now once more they do just as they feel inclined. One has snapped up a bee, but immediately throws it away. Apparently the bee has stung it, for it opens and closes its beak in a peculiar way, and scratches itself with its little foot.—Never again will this chicken pay any attention to a bee. So much it has already learned from experience: it will dread bees as a burnt child dreads the fire.

A blindworm is crawling along the path. A slight ruffling of feathers on the outstretched neck of the hen, a warning cry, and the chickens recoil from it. Henceforth the chickens are *afraid* of blindworms, and still more afraid of snakes if they ever encounter them. In many hens this dread of reptiles persists throughout life.

Next they learn to fear dogs and cats. The mother bird is courageous enough to attack these formidable creatures at the risk of her life, and will even fly in their faces. Over and over again I saw my own brood-hens deliver such attacks, with the result that the astonished adversary beat a retreat.

Here is an important question: Would the chickens *of their own accord* have learned to fear the creatures I have named? Or would their instinct perhaps have warned them in time against snakes, blindworms, dogs, and cats? The problem cannot be solved theoretically. In order to obtain the

correct answer we must ask the chickens themselves; not members of the family of a hen, but chickens hatched in an incubator. With this intention I have introduced artificially brooded chickens to all sorts of animals unknown to them. In one case I offered two chicks an earthworm, held in a pair of forceps; they seized it in their beaks, stretching it to its full length, and held fast. Before other chickens I placed a tray from which a blindworm and a salamander were making lively attempts to escape; but the little birds did not betray the slightest fear. Now I took a grass-snake, and set eight chickens upon its back. Disregarding its burden, the snake crept across the table, while the tiny chicks were concerned only with preserving their equilibrium, and did not betray the slightest sign of fear. I then took another grass-snake, and allowed it to creep towards a couple of chickens (Plate 2). These also were apparently incapable of fear, even when the snake crept between their legs. Fear, then, is *not innate* in the chicken, but is *acquired*, as we have seen in the case of chickens hatched by a hen. Of course, I most carefully guarded my incubator chickens against any sort of fright. On approaching them I never made a sudden movement of my hands, and all possible care was taken to avoid startling them by a violent bang, or the sudden flashing of a brilliant light, for such impressions might even produce symptoms of shock. Our hens, however, did well to warn their offspring against danger, for without the rules of safety instinctively inculcated by their mothers the chickens would have been completely at the mercy of their enemies.

Incubator chicks never hear a mother's voice, never hear a cry of warning, unless one rears them in the company of older chickens. All the more remarkable, then, is the fact that nevertheless, in the course of seven to nine weeks, they begin to emit various notes. This shows that *all* the notes of the chicken are *innate*—that the chicken does not have to learn them from its mother. Even the cry of warning comes of itself; in naturally reared birds as early as the third day, and in incubator birds about the sixth or eighth. I have observed this even in young birds which I reared in complete isolation from any contact with parents or brothers and sisters—as was the case with some young herons (Plate 3).

Many young birds are able to drink almost as soon as they have begun to peck at the eggshell. I noted this in three wild ducks which were hatched in the incubator. Each drop of water was greedily accepted by the tiny bill protruding from the egg, and acknowledged with a chattering sound. Now and again, too, I heard short piping notes.—As in the case of the ibis and heron chicks, I was struck by the vigorous wing-movements by means of which the ducklings worked their way out of the shell. Even before they were dry these tiny creatures, which had only just come into the world, began to preen themselves, and smooth their backs with their heads, just as their elders do, and to scratch with their little feet. These *autophagous* birds were capable, on the very morning of their birth, of pressing their bills to the glands of the "parson's nose" and anointing themselves. If we reflect that

by the end of a week the little ducklings have to be completely independent, and that if birds of prey or human beings should deprive them of their parents they literally have to rear themselves, we cannot wonder at the rapid tempo of their development.

We have now seen how chickens come into the world and try to find their bearings in it. In the next chapter their psychic relation to a community will be described.

3

THE POULTRY-RUN

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I SELDOM pass a poultry-run without lingering awhile and admiring the varied colours and activities of the inmates. Here we find only gregarious creatures, herd animals; birds, that is, accustomed to live socially; cocks and hens, ducks, geese, turkeys; mothers and offspring of all these species, and a flock of pigeons into the bargain.

Here on the farm, thanks to the human art of genetics, there has been collected, for thousands of years, a world of living creatures such as we seldom have a chance of observing in a state of nature: birds that run, and birds that swim, and birds that fly living permanently in one and the same environment; sometimes—on isolated farms—quite unrestricted, even to-day, by fence or wire, retained only by their inherent attachment to their home, their homing instinct.

Despite this close proximity, no species has surrendered any of its characteristics; each has preserved its own instincts, its own habits, and its own language; each is respected by the other species; each knows the strength and weakness of its neighbours, and so, without compulsion, avoids hostilities. And while, from time to time, a quarrel is unavoidable, yet in the moment of danger unanimous agreement and understanding prevail.

It is otherwise within the individual groups. There is *rivalry* among cocks, ganders, drakes, and male pigeons; newcomers and the weak and sickly have no easy time of it; indeed, they may even be in danger of their lives unless they keep to themselves, or summon up courage to fight. Despotism and male tyranny—and also envious greed and hatred between individuals—may establish themselves as permanent conditions; and on the other hand there are lifelong *friendships*.

The activity of this feathered world reaches its climax at the time of the midday meal; there is tumult and a babble of voices, and now and again a mutual pecking of heads. When satiety is reached the curve of activity falls, and the general bustle is followed by idyllic peace. The hens take sun and dust baths; the ducks and geese, after a brief douche, dry and preen their plumage; and all put their heads under their wings and take their afternoon nap.

At the end of the sixth to the eighth week our brood-hen will be able to rid herself of her offspring. For now she will have to lay again, and then start brooding afresh. Accordingly, when her time has come, she slips away from her chicks and betakes herself to her nest-box. For a few nights longer she will continue to keep them warm against her body, and then she will bid them a lasting farewell. Any importunate affection on the part of her offspring is chastised with a few pecks on the head. Now, psychologically as well as physically, she has ceased to be a brood-hen; she has become once more mere *hen*. Having set up a permanent barrier

between herself and her chickens, she mixes again with the rest of the cocks and hens, while the chickens at first form a little community of their own.

Little by little the chickens' voices begin to break. Not only do they now grow deeper in tone, but many of their notes are now discontinued; as, for example, their chirp or "peep," which would henceforth be purposeless. Some, according to their significance, still persist, merely assuming a different timbre, while other sounds of an entirely new character make themselves heard; for example, the *crowing* of the cockerel, the *clucking* of the hen, and others. If the chicken turns out a pullet it has now, according to my observations, thirteen different sounds at its disposal, while if it proves to be a cock it has an anthology of fifteen different sounds, among which are three different forms of the call-note and three of the cry of warning. Every one of these sounds is *innate*, and makes its appearance at the proper season; not one of them is acquired.

The cock is the ruler of the poultry-run or farmyard, and he suffers no rival. He is accustomed to being the only bird to crow, and this mustering-call is addressed not only to his many wives but also to his possible rivals. In the early hours of the morning the crowing of individual cocks may be heard far over the countryside. Challenge and response are heard far and wide for hours on end. To the best of my knowledge the neighbouring opponent is recognized by his voice, and woe to him if he dares to come over the hedge!

But above all the young cockerels must be guarded against the cock. Hardly have they made

their first attempts to crow when he rushes, blind with fury, at one or another of them, and finally all are driven away from the feeding-ground. And on such occasions one of them may even be killed, as I learned from my experience of my own little poultry-run. The cock, and only he, is the leader. He won his place, inasmuch as he supplanted an older, less pugnacious bird, or surpassed his brothers in strength and agility. By the hens his rise to power was accepted in silence. It is usually so in the animal kingdom when the rôle of leader is in question. But there are exceptions. Among my wild geese, for example, I noted that one day a certain order of march was observed. One of the birds—by no means the largest—placed himself at the head of the file; the others fell in behind him. But a few days later another gander pushed his way to the front, without encountering any opposition, and this order also was accepted without protest (Plate 4).

A despotic cock will often continue to assert himself for a long time; indeed, he may successfully intimidate his fellows all his life, or at least for a period of years. But hens also peck at one another, as may be seen when newcomers are introduced. Uncertain of their bearing, and usually intimidated, they are already at a disadvantage as against the accustomed inmates of the poultry-run. There are of course exceptions: courageous and vigorous hens who are experienced fighters, or now and again a cock who carries all before him and becomes the despot. A cock who is once defeated seldom regains his position; he remains an outcast, a discouraged

ate 4. When my Wild Geese were 10 weeks old they would walk only in single file behind a leader.

late 5. The Lamb and "Bibi," the Duckling, were often to be seen together.

Plate 6. Two Turkeycocks ready for hostilities.

creature who dare scarcely venture to claim his share of food. It may even happen that his nervousness costs him his life.

A familiar phenomenon in the poultry-run is *greed.* Based on the instinct of self-preservation, it becomes most obtrusive when there is little food and much competition. It is, undoubtedly, most prevalent among the *birds of prey.* After all, these have to seek their daily prey; their food is won with effort, if not by actual fighting. But there are days when no victim greets the robber's eyes; often enough he has to go hungry to his nest or eyrie, so that we can hardly be surprised if he defends his hard-won booty with all his might, as his rightful property. The behaviour of the herbivorous animals is naturally quite different: for example, the red deer, the roebuck, and other ruminants, or the horse. All these find their table ready spread. Only among such animals as are kept in captivity does a different kind of behaviour reveal itself. My goats would stand side by side at their manger, and as long as this was full there was no dispute; but if food was scarce for once in a way they would butt at each other. They were greedy over the last mouthful. We may see similar incidents in the poultry-run.

So long as we scatter their corn over a wide area, the birds are peaceable enough, but if we make them eat out of pots and bowls they soon come to blows; the stronger and bolder birds displace the weaker and those which are afflicted with an inferiority complex.

Besides this greed for food there emerges, in due

course, *sexual* greed. Among cocks, of course, this leads to bitter and stubbornly contested battles. It would be quite erroneous to conclude that this jealousy affects animals as it does human beings, as a slow poison that may embitter past and future, as a constant, gnawing misery. It is rather the expression of a healthy and momentary interest, suddenly emerging, and as suddenly disappearing when the goal has been attained. For example, the same dogs which have just been entangled in play will fly at one another in a moment, gnashing their teeth in fury, directly an old object of dispute—a scrap of meat, a bone, or what not—happens to catch their eyes; and conversely, they may pass in a moment from serious strife to play. For the animals live *in the present*; they know no future, and they do not cling to the past; that is, they do not brood over memories. Only at the sight of the object of their love or hate is the appropriate emotion released.

Very different in character from greed, envy, jealousy, is *hatred* in the world of animals. Even its psychological origin and psychic background are different. It may be based on conflict, on jealousy, on the daily recurrence of greed, and on ill-treatment, or it may also have a sexual root.

I once witnessed a very characteristic example of hatred in the animal world in my poultry-run. It was in the year 1928, when I increased my feathered stock by a pedigree strain of Plymouth Rock chickens. One of these grew into a cockerel, who in the following December crowed for the first time, and gradually began to tread his sisters,

and also older hens. One of the latter, stronger than he, always offered a vigorous resistance. But since the cock was soon as strong as she, and presently even stronger, the hen's life was in great danger, so that I had to place her in a pen, which was roomy enough, but wired on all sides. This did not prevent the cock from running at her from all directions; so I took the hen out and placed the pugnacious cockerel in the pen. Strangely enough, he soon became quiet in captivity, and further, he no longer saw the hen. But if I went up to the pen with the hen in my hands he would leap up, inside the coop, frantic with rage, to the level of the bird which I was holding, pecking quite crazily through the meshes of the chicken-wire. His aversion to the hen finally became so great that I could not take her to the poultry-house until all the birds, including the cock, had flown up to their perch. But even then she was not secure against his attacks. Apparently he recognized her voice. Although the poultry-house was absolutely dark, he clambered over the other hens in the direction of his hated enemy, in order to fall upon her.

That the cock had actually recognized the hen by her voice I was soon in a position to prove. Next morning I shut her up alone in the poultry-house, scattered some food outside the door, and called the whole feathered company. As I anticipated, the imprisoned hen began to cluck, whereupon the cockerel, with every symptom of excitement, charged against the door. In this case it was merely the voice of the hen, and not the sight of her, that aroused the cockerel's hatred.

All this goes to show that this was a case not of jealousy but rather of a sort of resentment, in the human sense of the word; with the difference, of course, that the cock no longer thought about the hen in her absence, but was always excited afresh by the sight or the sound of her.

On the other hand, side by side with such enmities in the poultry-run we see exceedingly *friendly relations* between individual comrades. Many chickens, in early youth, display a mutual attachment which continues throughout their lives. I once had two pullets, from the same brood, who at the early age of six weeks drew apart from the rest of the hens, always going about together and roosting together. When one of them hatched out a brood of chicks her friend shared the task of rearing her offspring, calling them together and giving them many titbits from her own beak.

On another occasion I had a hen who sat on a clutch of turkeys' and ducks' eggs. (The ducks' eggs had to be set under her a week earlier, as they take twenty-eight days to hatch.) When the little birds came into the world they behaved exactly as though they were all one family, although the two species, owing to their different way of life, had to be given different food, and although the ducklings went into the water. For that matter, it was a remarkable fact that the turkey-chicks tried to imitate the habits of the ducklings. If any one of the tiny creatures was separated from the little flock there was an outcry and a restless running to and fro until they were all together again. When they went into the meadows they marched

in single file, under the leadership of a turkey-cock, although there were drakes among the ducklings. In the meadows they would all lie down until one of their number rose, when the whole family would set off again. As yet they knew nothing of greed or envy, even when their food was offered them in a small receptacle.

Ducks are more sociable than geese in their relations with other creatures. Geese, indeed, possess a strong sense of community, but they will at first decline to have anything to do with a stranger of another species; in human language, they are reserved. An intruder into their society is at first bitten until he takes to flight; it is some time before he is accepted.

On the other hand, I have repeatedly noted in geese a strong tendency to attach themselves to ducks or hens, and also to human beings. When the number of geese grew smaller and smaller, until at last only one bird was left, it became evident that the survivor found it impossible to live in permanent solitude. And this need of society is felt not only by the social creatures but even by such solitary animals as the badger, of which I shall speak later.

In the summer of 1934 I reared a solitary duckling, which from the first was thoroughly accustomed to human society, came at call, and ran after us in house and garden. This confidence in human beings was transferred to various animals as well, so that our duckling used to go about with a dog, and also with a lamb, and she would even go to bed with the latter. The too boisterous wolf, indeed, was treated

with a certain aloofness, and if he frightened her by approaching too near she would give him a peck on the muzzle. Later on, however, they came to a sort of agreement; that is, they no longer molested each other (Plate 5).

My young turkeys, which were larger than the duckling, would at first have nothing to do with her; on the contrary, they pecked at her. "Bibi," as we called the duckling, defended herself as well as she could, with the result that for a week or so the turkeys kept out of her way. But finally they formed a sort of alliance; in fact, the duckling imposed herself upon the four turkeys as their leader, and was recognized as such; and they followed her everywhere.

I have known many turkeys, from my childhood upwards, on isolated farms, and in small and large-scale rearing enterprises. I soon came to realize the despotism and intolerance of the older cocks in respect of other birds, and their aggressiveness towards adults, as well as children; so that with the bull and the billy-goat they were the only creatures which I avoided. My own mature turkeys, by reason of their imposing appearance, inspired respect in even the best fighters among the cocks, which consequently kept out of their way (Plate 6). But with us even the bigger turkey-cocks, weighing from 12 to 15 lb., were always good-tempered, allowing us to lift them up and carry them in our arms. Apparently their behaviour depends upon their upbringing. Over and over again, on other farms, I saw people teasing the little turkeys in order to enjoy their excited antics. Under such

circumstances is it surprising that these birds should turn upon the people who bully them? Does not this state of affairs remind us of badly-trained dogs, whose character may be completely ruined by teasing?

Turkeys have a larger vocabulary than the domestic fowl. It is a singular fact that they retain their cheeping note when they are no longer chicks. Psychologically they are less accessible than the domestic fowl. Less intelligent than the latter—and this is saying a great deal—there is something impervious in their character. For example, they have a quite individual manner of *playing*. A turkey-cock or hen will begin, without apparent reason, to run round and round a tree, whereupon all the rest tack themselves on to the leader, tearing along, one close behind the other. An extraordinary merry-go-round of turkey-hens, moving with uniform rhythm about a centre! The moment the leader steps out of the closed ring the dance is abandoned. Often as I witnessed such performances, I could never discover any cause for this strange behaviour.

All the doings described in these chapters, which cover (though of course not exhaustively) the wide gamut of emotions between enmity and friendship, are by no means isolated actions, nor are they unique in character; they are adduced merely as *types* of behaviour. They afford us glimpses into the inner processes of the animal mind—or they may be quite unintelligible to us, and are thereby all the more interesting, as they give us something to think about.

The whole poultry-run offers us the spectacle of a sort of *communal life*, where, simultaneously with the free development of individual groups, certain mutual relations prevail, and the birds are free to fight or form friendships as they will. At ordinary times the individual group may appear to be almost without coherence, and it is only when some special event occurs that its members form a close confederacy against the dangers which threaten an individual, no matter which. Such perils may come from above, in the form of a bird of prey, or from a terrestrial enemy. I have a vivid recollection of battles with a hawk, and also a scuffle with a large weasel. Twelve years ago, in the month of June, I saw two stoats, which were coming from the direction of a neighbouring villa, crossing the meadow and approaching my garden. As presently appeared, they were a mother with a well-grown child. Even before the creatures had crept into the garden the cock had detected them, and alarmed the whole feathered community by his cries of warning. The sound was immediately understood, and answered by pullets, brood-hens, turkeys, geese, and ducks, and this within a few seconds. Before I could pick up my stick the female stoat had seized a chicken, and a moment later she had attacked another. In frantic haste the turkey-cock, a brood-hen, and her lord and master fell upon the robber and pecked her furiously. The smaller stoat, about to rush at the badly-wounded young pullet, relinquished her at the sight of the threatening danger, and made his escape. All around me the greatest excitement pre-

vailed; even the ducks and geese had appeared, and there was soon a variegated scrimmage of fighters, so that I could not have used my stick without injuring one or more birds. In the end I had to report the death of one chicken, while the other was seriously wounded; the cock had been bitten in the neck, and the robber, lying motionless on the ground, had lost one eye and received serious wounds in the head. It was a long time before the clamour in the poultry-run died down and the birds were able to go quietly about their business.

I have seldom had such an opportunity of observing in so unanimous a form the sense of solidarity between creatures of different species. *Here all were opposed to one.*

The environment of the wild-fowl, their manner of life, and their psychic attitude are absolutely different from those of our domestic poultry. Independent of human beings, they have to rely upon their own efforts; and whether gregarious or solitary, each bird provides for its own wants. I have always endeavoured to obtain an insight into the psychic life of wild creatures, and above all to observe their young.

I wanted to watch the development of their impulses and instincts and the appearance of long-established habits, and study the nature of their language, their forms of bodily physical expression, and their attitude to the environment; and also to discover how they learn, and to note the degree of animal intelligence revealed by different species.

Let us turn first of all to the Common Heron.

4

MY HERONS

★

We love March as the herald of spring. Then the first flowers appear in garden and field, and in the meadows, and along the borders of the wood; and many of our birds return from far-distant countries. These birds are differently esteemed, according to our tastes and inclinations. But the herons always have a certain fascination for us; perhaps because of their historic and romantic associations—for they remind us of the days of hawking and falconry—and also because of their imposing appearance.

I have often observed these birds—especially the Common Heron—for hours at a time; in the early morning, before the first gleam of red was perceptible in the east, and the world was still dim and grey, on bright summer noons, and in the evening twilight.

I have watched them in their heronries and on the banks of ponds, lakes, and running streams; in moments of danger and distress, and when they were absolutely undisturbed.

In Germany there are districts in which the heron appears by the end of March. (In England it is a resident, though some immigrants arrive in the autumn.) If, slowly furling its outspread pinions, it settles in a lofty tree and utters a loud call-note,

this heron is a male bird. In the female this call is absent.—This heron intends to build a nest. It is not for the female bird to choose the site, even when she has arrived before him, or when a number of birds are present and waiting to begin operations. Observation of the bird on the occasion of choosing a mate is sometimes attended with considerable difficulty; its behaviour has not been studied in detail, and any description of it must therefore be of a rather sketchy character. Sometimes the male bird is baffled by the frigidity of the female; sometimes he is too exacting. Strangely enough, a quite insignificant-looking female will sometimes rivet the interest of the male.

Once the sexes have come together, the building instinct awakes. Now the male bird seeks out a tall, well-grown tree, and decides, quite independently, where the nest is to be built. The female bird approves of his choice. Immediately under the summit of the tree a great basket is made of boughs, twigs, and brushwood. At this the birds labour almost all the day. It is a magnificent sight when the male heron flies to the nest, bringing bough after bough, twig after twig, and entrusts them to his mate, who receives the material and arranges it. Sometimes, however, the order is reversed; the female arrives with the twigs in her bill, and the male builds the eyrie.

When all is ready the birds proceed to mate. As many as six eggs may be laid; and then the process of incubation begins. The male bird usually sits on the eggs by day, and the female by night, until, one day, from four to six young herons are

lying in the nest. But it is seldom that all the eggs are hatched, and it may happen that one or two eggs have not been fertilized. Young herons are very exacting offspring. Almost before daybreak the parent birds have set out for some lake or pond or brook, and there they lie in wait, on the rush-covered bank, for incautious little fish. The fish must be quite small, not longer than the little finger, since the catch is intended for the nestlings.

The heron stands motionless, his keen eye fixed on the water. Now his neck and head are slowly extended horizontally—a fish is in sight. But if somewhere a twig snaps, or a footstep is heard, the bird cranes up to his full height, and if a human being is anywhere visible he quickly takes to the air.

Four wide bills await the homecoming parent; each nestling tries to be the first fed. Can the little creatures really eat already? At first they find it difficult. They have no difficulty in swallowing the food, but to get a proper grip of the fish, to pick it up from the edge or the bottom of the nest, is another matter, and for the first few days they cannot manage it at all. At first, therefore, the nestling takes its parent's bill in its own, when the fish slowly glides into the little bird's jaws. They really are jaws rather than a bill, for the hinder portion of the bill is so wide that I, who have reared many young herons of all species, am always astonished at its width.—Little by little the nestlings are given larger fish. The parent birds now lay them on the bottom of the nest, where they are quickly seized and swallowed by the hungry youngsters.

From this stage onwards there is little peace in

the nest. For the last fortnight I have heard all sorts of sounds from the nestlings; sometimes they actually quarrel, and threaten one another with their bills, and the weaker birds receive a shrewd blow from time to time. During the last few days before they take flight the young birds generally stand upright in the nest; in the end they fly off quite unexpectedly, and henceforth they find their own food. Not infrequently I found in the nest of the Purple Heron, under the living birds, a dead nestling, squashed flat and desiccated. The weight of parents and offspring had pressed it flat, and the sun had dried it. It does not say much for the intelligence of these herons that the parents had not pushed the little corpse over the edge of the nest, although they could easily have done so.

These and other observations were made in one of the largest primeval swamps in Hungary; namely, in the Lesser Plattensee, the Kis Balaton, a swamp nearly 15 square miles in area, which is inhabited by an incredible wealth of living creatures. In some years there are as many as two thousand five hundred herons in this swamp, of the greatest variety of species: Common Herons, Squacco Herons, Night Herons, Purple Herons, Silky Herons, and Egrets, or White Herons; and also Ibises and Spoonbills.

In a small acacia wood on the banks of Lake Balaton I have counted, on the Tihany peninsula, no less than forty nests of the Common Heron; that is, a whole colony. Far more impressive, however, was the vast herony in the great reed-bed. Here, in many places, the nests are no farther apart than

in the trees, but they are divided from one another as though by curtains, by reeds from 10 to 12 feet in height. In a comparatively small area I counted some twenty nests of the Purple Heron, while the old birds circled high above my head. And then—I stood speechless before the nest of an Egret. Four slender young figures, with filmy white crowns upon their heads, looked down upon me from their throne, like the king's children in a fairy-tale. I gaped, and wondered, and could find no word to say. They hardly moved. A breath of wind lightly swayed the tall stems of the giant reeds. From the radiant blue sky the fiery rays of the golden sun fell on the green reeds and these strange figures. The young birds, who were nearly twenty inches in height, were beginning gently to move their laryngeal sacs, as nearly all herons do when the temperature is high. Slowly I retreated from this solemn stillness, with the feeling that I, a mere human being, was here an intruder. The reeds clashed together over my head, and hid the resplendent figures from my sight.

Now I found myself standing before the great stronghold of a Common Heron. The nest was built upon the tall, broken-down stems of reeds, over which fragments of old reeds were laid. A few young herons were lying in the shallow depression. A little coronet of down shone upon their heads, and one of the little creatures was gently clattering with its bill. I had a good look at them, and wandered on. It took an hour to travel a hundred yards in the swamp. My goal was a willow-tree which I had known for years; it grew still farther

from the edge of the swamp. There I had already seen many herons' and ibises' nests within a restricted area, the nests actually touching one another. Here the young birds must have been only a week old; and as there were already four in one of the nests, I took one of them away with me. It was the smallest, which had the least chance of being reared by its parents. It is of this young heron that I am now going to tell you.

Many parts of his body were already covered with down, which was longest on his head, but there were still so many patches of bare skin that I immediately wrapped him in cotton-wool, and placed him in a cardboard box provided with air-holes. On reaching the Biological Institute, where I had other young herons to look after, and also some unhatched eggs, I began to feed him at once, giving him as his companion a little Night Heron. I was astonished to discover how many small fish this little bird could swallow in quick succession. It took ten small bleak to satisfy him. Thanks to abundant food and the warmth of the stove, the birds felt quite at home immediately. Unlike other herons of the same age which I have reared, the Grey Heron was able, on the eighth day of his life, to peck at my fingers, and to strike them. He also picked up a fish from the ground without the least fumbling, and without uttering a sound. At this time he was not yet able to stand and walk, nor could he sit upon his legs, so he had to lie on his big abdomen. When he slept he retracted his neck and closed his eyes and laid his head upon his nest, as in a pillow.

Characteristic of this bird were snapping movements of the bill, accompanied by a plainly perceptible clattering sound. These movements were always made if I approached him more quickly than usual. His excitement at such moments was betrayed by the parting of the sparse, downy feathers on his head.—On the whole, he had grown quite accustomed to me within twenty-four hours.

On the other hand, he was greatly excited if anyone went past the open door. Then the down on his head would part, and he would make snapping movements with his bill. Once, eight days after his arrival, when I approached him wearing my spectacles, he came towards me excitedly, croaking; he actually had not recognized me. I had the same experience with various other older herons.

If I took my heron out of the nest he croaked uneasily. When unmolested he sometimes emitted a gentle whistle, as did my Purple Herons. On the same day he began to chatter. He then began to make a sound which resembled a long-drawn chitter, interrupted by pauses. He would do this sometimes for some minutes on end, and a year later he was still making such sounds. He made them when he had sated his appetite, or occasionally when he was enjoying a sun bath; they evidently expressed a feeling of physical satisfaction. On the same day he began really to chitter, so that on the eighth day of his existence he already had *five* different sounds at his command. Each of these sounds was innate, as I was later able to demonstrate in the case of incubated herons. These, at

Plate 7. Suddenly I saw before me in the reed-thicket a nest with four dazzlingly white slender young Egrets.

Plate 8. When my Grey Heron was hungry or excited he always began to scold and rock his wings up and down.

MADE IN GREAT BRITAIN

the same age, had exactly the same number of sounds at their disposal. The bird continued all these vocal utterances until the winter. In November he increased them to *eleven* distinct sounds. This means that the Grey Heron has a greater vocabulary than any other young heron, and—excluding the song-birds—must be reckoned among the more richly endowed birds in this respect. He is moved to give voice by a number of different motives: by hunger, thirst, and excitement or anger when fighting, and also by physical discomfort, etc. I will not attempt here to give a more detailed description of the individual vocal utterances, but I cannot pass over the chittering, for this is as characteristic of the heron as the whining note is of the young stork. This chittering is usually a sign of hunger, but it may also express irritation. As a rule it is at first inconspicuous and desultory, and comparatively quiet, but with increasing hunger it becomes more audible, and at last intolerably loud. While at first the bird shows no particular signs of excitement, the chittering is presently accompanied by rocking wing-movements, while the head is shaken from side to side, or held very low. If hunger is the cause of the chittering the sounds become fuller in quality when the hunger becomes more acute, or when fish are in sight. But if the sound is caused by some other powerful stimulus—for example, by the approach of a person whom the bird dislikes—the head may be thrown upwards from time to time; and the chittering may become a complex of various sounds and tones (Plate 8).

While I have spoken at some length of the speech of the Grey Heron, I have done so for a good reason; namely, in order to demonstrate the multiplicity of *innate* sounds, and also to show that each individual sound has its *own meaning*; that none of them is employed in vain. At the same time, one and the same sound—such as the chittering—may have different meanings at different times. In such cases there is a slight difference of modulation, emphasis, and quality, with certain movements of the wings and head, when the chittering at once has quite a different meaning.

The sessorial birds often remain sitting in the nest until they take flight, and the nest, of course, offers them little possibility of movement. In many cases they begin to walk or fly without any preliminary exercises. Nevertheless, we are surprised when the young starling, for example, leaves his home one day as though shot from a gun, flying twenty to fifty yards at a stretch. Falcons, owls, herons, and storks may often be seen standing up in the nest when the time for flight is approaching; they may also be seen walking along twigs and boughs, and attempting to preserve their balance by appropriate movements of their wings. My young heron made his first attempt to walk on his sixteenth day, when he took nearly five minutes to cover 20 inches; on the eighteenth day he covered the same distance in about three minutes; on the fortieth day he glided nearly 40 feet, and soon afterwards he climbed into a tree. Curiously enough, the time for migration passed without affecting him. He remained in my garden, and contented himself

with looking about him from lofty perches—the summer-house, the tops of cages, and trees. He soon became accustomed to me, and later on to his environment. He also learned to know my voice, even my whisper, and so forth. Just how plainly these two birds—the Grey Heron and the Night Heron—were able to distinguish my voice from the voices of other persons I noted on various occasions; for example, when I was travelling from Tihany to Munich. The herons were packed in a chest whose lid was perforated with air-holes. When the railway officials were standing beside the chest —as in Budapest, Vienna, Salzburg, and Munich— the birds did not utter a sound, although the men were talking to one another. But if the birds heard my voice among the rest they immediately began to chitter, although it was quite impossible for them to see me. At home I often made experiments under similar conditions, always with like results. It was the same with my other herons— the Silky Heron, Squacco Heron, and Purple Heron—and also the Spoonbill. These too were able to distinguish my cough, and whisper, and the sound of clearing the throat, from those of other people.

The *tameness* of the Grey Heron was manifested in various ways. Even when he was making his first attempts to walk he liked to sit beside me in the grass. If I was resting in a garden chair he would lay his head on my foot, or even thrust his bill into my clothes. This is the more remarkable, inasmuch as herons are generally intractable birds. This particular heron lived in constant enmity with the little

Night Heron which had been reared with him. The latter, however, was more pugnacious than he. Either of them would attack my dogs, foxes, monkeys, and other animals, and the Night Heron even repeatedly attacked the wolf; in fact, whenever the latter passed his cage. The Grey Heron would attack strangers, and even the maid, which is the more remarkable, inasmuch as he often came into the house and rapped against the doors with his bill, demanding admission, until someone found a bit of meat for him.

The Grey Heron is one of the most expressive of birds. It is comparable with an extremely sensitive instrument, which registers the faintest impressions, imperceptible to human senses. If a slight shadow passes over the garden, or a faint, unfamiliar sound excites it, the head-feathers immediately begin to ruffle. An aeroplane appears on the horizon; my heron presses his wings to his sides, his neck rears like a snake, the head, smooth as an eel, with the feathers laid flat, points obliquely upwards, and the keen eyes search the heavens in order to follow the unknown phenomenon.

The rhythmical movements of our Grey Heron are strangely effective when, holding his wings a little way from his body, he rocks them loosely up and down, and with crest erected emits his chittering cry.

My admiration for him was increased when he treated me to a picture of incomparable beauty—the heron bathing in the rays of the sun. His head pointing skywards, his wings drooping, so that they form a shield-like frame for the splendid body, the

slender form surrendered to the scorching rays, the bird stands motionless; a subject which probably no painter has ever seen.

While in this heron the migratory instinct was hardly perceptible, it was very strong in my Night Heron, in which it awakened year after year. But as the following example shows, this instinct may die out in the second year.

My Spoonbill was reared by me from the time when he was a chick, and after a few weeks he had become completely accustomed to me. Throughout the summer he rambled about the garden, and also entered the house, climbing the stairs, and occasionally tapping on my door with his long bill. Towards evening, in the company of his much smaller friend, a Falcated Teal, he would seek his quarters, just about the time when the hens went to roost. Then came the season of migration. I prevented him from taking flight; firstly, because I was very fond of him, and secondly, because he was one of a series of birds which were reared for purposes of research. By way of compensation I was willing to let him go the second year. As a matter of fact, I set him free, at the proper season, in a swampy spot near a well-known Bavarian lake. Not far away was a little hamlet, consisting of a few houses and a church. My bird was at once instinctively at home in this new environment; he sought and found all sorts of things, and valiantly waded about in the swamp. Two gentlemen whose acquaintance I chanced to make there were interested in him, and assured me that I could return home without worrying about him, as they

would keep an eye on him and inform me if anything particular should occur.

I was told that about an hour later the Spoonbill flew to a spot some two or three miles to the southwards, but in the evening he returned to the place where I had left him. However, he would have nothing more to do with the swamp, and went into the church, which was open. There he was caught, and placed for the night in an empty stable. But as on the following evening the same thing happened, and as moreover the bird was attacked by a dog, I was informed, over the telephone, that my presence was desired. Hastening to the spot, I drove home again with my Spoonbill. After all, it seemed that he preferred his old home.

Very different was the behaviour of my young stork. Towards the end of August 1932, when in the middle of the garden, he soared into the air, flew towards the church steeple, hovered above it at a height of some 300 feet (for perhaps a quarter of an hour), and then set off in the direction of Munich. Next day he was back again in Solln, but could not find our house, and alighted upon the roof of another house about 200 yards distant. (The numerous villas of this straggling neighbourhood are surrounded by gardens and look very much alike; also this was the first time the bird had flown.) Fuzz, as he was called, knew me at once by my voice, and quietly allowed himself to be caught and carried home.—After this he made no further excursions.

5

FALCONS

★

On June 18, 1932, the gale flung six young kestrels, with a great part of their nest, from a tall spruce in the courtyard of a farm-house. That year all the nesting-sites in the church tower were occupied by fellow-kestrels, and hence it was, I suppose, that a further pair, faithful to their sense of locality, had settled in the neighbourhood of the church. This pair had six young. One of the nestlings escaped somehow; the rest were brought to me.

There was a certain variety in the markings of these young kestrels. In the plumage of four the white was predominant over the brown; but the fifth was still clad mainly in white down. I estimated that the birds were about three weeks old. They all mewed and spat like cats; four assumed a defensive attitude, with open beaks; but the largest already struck at one vigorously with his talons. On June 19th three of them defended themselves with their talons when I tried to pick them up, having wrapped a white cloth round my hand, and already they were able to spread their wings. But on the third day their behaviour altered; they now ate out of my hand like chickens, two and then three at a time, after which the fourth and fifth pushed themselves forward. By the end of a fortnight they all came on to my hand directly

I held it towards them. And now they would fly a couple of yards (Plate 10).

By June 26th the young kestrels had already uttered six different sounds; they spat, rather like owls, and when they were hungry they emitted the familiar cry by which the hawk expresses desire. If food was not immediately available they called attention to themselves with much the same sound as that made by our song-birds and swallows when being fed. From time to time they cheeped like chickens, and they also had at their disposal a note of fear or alarm; indeed, with closed beaks they even emitted a sound like the quack of a duck, whose significance I cannot interpret. When they first set eyes upon my Howler Monkey they uttered a warning cry (Plate 11).

One day the largest of them, apparently a female, flew away from the open basket in which they usually rested after a full meal. She made, with her head, the nodding movements typical of all falcons, suddenly unfurled her wings, and disappeared out of sight above the meadows, first passing through the boughs of a beech-tree. It is a remarkable fact that many of our birds unfurl their wings without any preliminary exercises, and fly off with astonishing certainty. For example, when our young swallows fly out of the nest for the first time they do so suddenly and without the least hesitation.

When owing to a dearth of mice I gave the young kestrels a dead sparrow they became quite ferocious, fighting for it and devouring it to the last feather; and they again struck out at me, as on the first and

Plate 9. The Peregrine Falcon "Onyx," whose power of vision far exceeds that of the human eye.

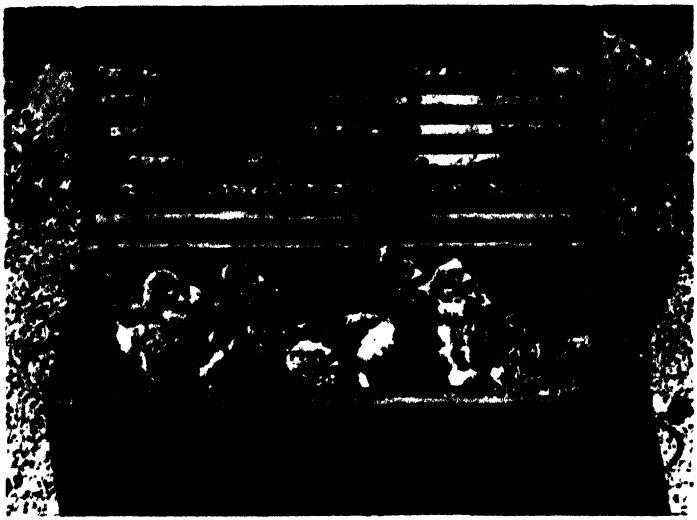

Plate 10. When the five Kestrels saw me coming they spread their wings and uttered shrill cries.

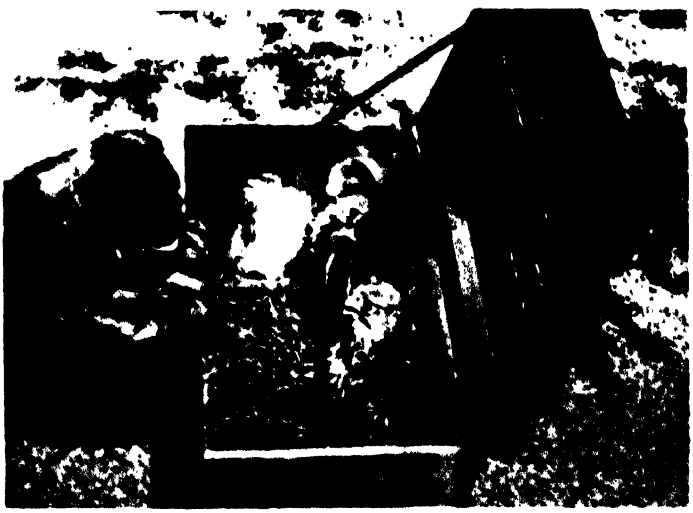

Plate 11. When the Howler Monkey approached the Kestrels they took fright and set themselves with their backs to the wall.

second days of their captivity. But they soon grew out of this habit.

I now placed them in a larger cage. Henceforth they were always fed from the hand. Each bird came forward separately and took its portion of minced meat. Then I began to give them mice, which had in the meantime been breeding in the fields and meadows, and when they had learnt how to deal with such prey I decided to take them all into the woods and let them fly. At first I took two of them with me; but instead of flying away they remained within reach. I waited, in hiding part of the time, for about an hour, and since they still had not flown I put them back into their cage. A week later I made the same experiment with two other birds, and these very quickly flew off. One hopped up into a tall birch-tree; the other flew off into the wood and was soon out of sight. On the following day I released the two first mentioned; for a long while they slunk from place to place, eyeing me and their surroundings, and after perhaps half an hour of this they flew off.

Such a farewell is always grievous to the lover of animals, whether he is parting with a bird or a four-legged creature. Many birds depart gladly; many come back again; but after all, freedom is the most natural state for all living things. Hence I take care that they are not wholly unprepared for liberation—as far as possible, at the proper season.

For example, when my magpies had been free for about a fortnight they were seen at different times as far as two miles away on the outskirts of

Solln. For a few weeks I took care of a little sparrow, which I found in the woods, where he was sitting, quite helpless, in a fir-tree. Then he left me, but he came to the window twice or thrice daily, and caught very deftly in his claws the scraps of meat which were thrown to him. This continued for about a week; then he came only twice or perhaps only once a day, and three weeks later he had disappeared for ever. It was interesting to note that he always announced his arrival by loud cries, so that I could be ready for him.

In their parents the kestrels have not only faithful guardians but also good providers. Strangely enough, the male parent's way of feeding them differs from the female's; indeed—as is often the case also when the birds are building their nest—he does only journeyman's work in the matter of providing nourishment. At Schloss Oberstadion, in the summer of 1934, I watched a pair of kestrels rearing their young, then three weeks old. The nestlings were in a box with a round entrance, about the height of the roof. After repeated observations from a parallel wing of the building Count Mensdorff was able to state that the female bird brought the youngsters a mouse from time to time, which she divided into as many parts as there were nestlings, but always threw away the head. The male bird proceeded quite differently. He would lay the mouse in front of the entrance-hole if his mate was at home; otherwise he would carry the booty into the nest, but would leave the work of dividing it to the female.

Many falcons appear to be equipped with an

absolutely fabulous sense of direction, as the following example will show.

In Gödöllö, near Budapest, Count Mensdorff, the most celebrated falconer in South Germany, bought a so-called Saker Falcon, a few months old, packed it in a box, and took it to Böblingen aerodrome (near Stuttgart) by aeroplane. From the aerodrome he travelled by motor-car to his destination, Oberstadion, which lies at a distance of some twenty-five miles from Ulm. Here for a week the bird was allowed to fly at liberty in company with other falcons. It was then sent to the Master of the German Order of Falconers at Düsseldorf. Here again it was allowed to fly at liberty with other falcons. Nevertheless, a week later it disappeared. But it was heard of again. About forty hours after its departure from Düsseldorf the bird was shot by a gamekeeper near Gödöllö, and since it was ringed its identity with our Saker Falcon was established.

This was a most remarkable, and indeed quite incomprehensible performance. We cannot very well assume that the bird had flown across Württemberg to Gödöllö, for then it would surely have returned to Oberstadion; probably it flew to Hungary by the direct route, which was entirely unknown to it. How long it took to fly that distance we cannot say, for we do not know whether it was shot immediately after its arrival or some time later. How it found its way to Gödöllö it is impossible to explain.

With the exception of our Hobby, an admirable flyer, all the falcons become extremely tame;

especially the Peregrine Falcon, which we shall now consider in its quality of "hawk of the lure." I shall describe how I attempted to test its range of vision—which is possible, of course, only with thoroughly tame and well-trained birds.

How far can the falcon see? How far do birds in general see? How far does a dog see—a roebuck—a horse? The question may be asked in respect of as many animals as we please, but the answer must always be the same if mountains, towers, ruins, rocks, and even houses are to be reckoned as the objects of vision. We can only repeat that we do not know and have no means of knowing. For apart from the fact that we cannot look into the animal's mind we have absolutely nothing to go upon in estimating its range of vision. Further, we must not overlook the fact that every animal lives in its own world, or rather, has its own environment. Here it finds its food, its mate, its nesting-material, or its dwelling, its comrades, and its enemies. Nothing else has any meaning for the animal, and perhaps it is not even seen. Thus every animal species has its own environment of *things*. For the kestrel ruins, towers, mice, and a few other things are extraordinarily and vitally important. For the lark, for example, towers and ruins, and, of course, mice as articles of food, simply do not exist.

If we wish to discover how far a dog or a falcon can see we must have other objects of vision: *living* objects, which have the power of movement, and are included in the sphere of the animal's interests. It was on this principle that I proceeded when I tested the dog's eye for its range of vision. The

dog is not what we call an *Augentier*, an "eye-animal," but a *Nasentier*, a "nose-animal." The bird, on the other hand, is an "eye-animal," whose eye is its most far-reaching sensory organ.

How could one contrive to offer a bird an enticing object, a lure? I did not for a moment doubt that for such a purpose only a bird trained for hawking—that is, one of the different species of trained falcons, or a trained goshawk, or other raptorial bird—would be suitable. My assumption proved to be correct; and I finally decided, for several reasons, on the Peregrine Falcon, for no other bird is so adroit and active, and so well suited to my purpose.

Among the civilized peoples of antiquity no bird was so highly valued and honoured as the falcon. Not only did the Indians regard it as divine, while the Egyptian Osiris appears on bas-reliefs and gems with a falcon's head, and in Greek myth it was called the messenger of Apollo; but it was also trained for the chase by the Indians, the Persians, and various other Oriental peoples. At the time of the great migration of the peoples the sport of hawking made its way into Central and Western Europe. The Hohenstaufen Emperor Frederich II, a great lover of Nature, was reckoned the finest falconer of his time, and in 1896 his book, *De arte venandi cum avibus* (*Concerning the Art of Hunting with Birds*), was published in a German translation.

Happily there has been a renaissance of falconry in Germany since 1923, and the old division of the German Order of Falconry into regional branches has been revived, while falcons and goshawks and other hawks have been trained as specialists: as

falcons for partridge, pheasant, duck, woodcock, and rooks. But the chief "hawk of the lure"[1] is and remains the Peregrine Falcon. The little merlin is trained for woodcock; and the female goshawk for rabbits or even hares. In the case of falcons and hawks alike the male bird, which is generally smaller, and is technically known as a *tiercel*, is trained to follow lighter game; for example, the goshawk tiercel is trained for pheasant. The female sparrow-hawk too has been employed with good results, and even the Golden Eagle has been trained for the chase. In North Africa, and in the steppes of Asia, the eagle is even flown after the wolf.

To my great satisfaction, I was able to get into touch with the head of the German Order of Falconers for South Germany, Count von Mensdorff-Pouilly, who was kind enough to invite me to his family seat for the purpose of carrying out my tests, and to place various falcons at my disposal.

For measuring distances I employed a range-finder—the Zeiss "Inverttelemeter." I got a qualified engineer to make the measurements, and the results were corrected in the Geodetic Institute of Munich, as is always necessary in the case of readings with the instrument employed. Consequently the figures given may be taken as scientifically verified. All the tests were made at Oberstadion (Württemberg), but with a constant change of scene. The two Peregrine Falcons which I employed for the purpose of testing their range of vision, the female *Irat* and

[1] Hawks and falcons are divided into "hawks of the lure," i.e. falcons or "long-winged hawks," and "hawks of the fist," or "short-winged hawks" (TR.).

the tiercel *Onyx*, stooped at the lure, which consisted of two rooks' wings bound together. Irat had already been trained to take rooks, while Onyx had not hitherto stooped at a bird of any kind, and at my request was to be flown only at the lure.

The first test (August 15, 1934) was made at a moderate distance: to be precise, 528 metres. Irat made straight for the lure. The second test, at 876 metres, was equally successful. This time the bird had to fly over rising ground, against the wind (strength 3–4, or 15–16 miles per hour). On the following day Count von Mensdorff found that this falcon reacted to the lure at a much greater distance. The bird had been circling high above a spruce-tree in which some rooks had taken refuge, but on turning back had caught sight of the lure, and had responded, while still circling above the tree, with an irregular flapping of the wings. But when the lure was thrown up a second time she came down immediately. The distance between the top of the tree and the spot where the falconer was standing was measured, and found to be 1,325 metres.

On August 15th, at 5.0 p.m., under conditions of good visibility, with a barely perceptible wind, Irat was expected to fly to a locust-tree which stood at a distance of 1,922 metres, on the edge of a dark wood. The falconer, Herr K——, swung the feather lure, but its movement was not perceptible even through binoculars (× 6 diameters). The falcon, however, flew at check—she had not been looking exactly in the direction of the lure—making almost a bee-line for a stubble-field which lay at a distance

of 1,077 metres. As afterwards appeared, some pigeons were looking for food in this field. At such a distance the birds were so small and their movements in foraging and eating so inconspicuous that we could hardly have noticed them even with the aid of the binoculars. Compared with the displacements of the feather lure the pigeons were all but motionless. We had vainly searched the field, which was brilliantly sunlit, for signs of life, and first saw the pigeons when the whole flock rose into the air. Then we saw that the falcon was chasing one of them, and that she disappeared behind a house. Afterwards we learned that she had followed the pigeon into the smoke-house of a farm, where the bird escaped through a window, while the falcon could not find the way out, and remained in the smoke-house until the falconer arrived.

The tiercel *Onyx* had not hitherto been accustomed to fly great distances. The first time he flew off rather reluctantly, describing a circle of about 50 metres in diameter, settled on a tree, and then immediately stooped at the lure. Nevertheless, I tested him over a distance of 1,559 metres. Having first been unhooded, he was placed upon the roof of a small wooden hut which stood in a hollow. (On the way to the field of operations the bird had worn his hood.) We took up our position on a hill from which the falconer could no longer see the lure with the naked eye. Onyx, however, reacted to it, and raced off in its direction, rested for a while on an electric standard, and then made straight for his destination.

A last experiment with Onyx was made at

11.30 a.m. on August 16th. The sun was blazing, and the rising vapour quivered above the lush hayfields; for there had been heavy showers during the previous day and night. Despite these by no means favourable conditions, I tested the tiercel over a distance of 1,661 metres. In the background of the perfectly level area was a brightly-painted farm-house. The tiercel, carried by Herr K——, and unhooded from time to time, did not at once react to the lure at a distance of 802 metres, but did so immediately a white handkerchief was attached to it. This he recognized quite clearly at a distance of 1,150 metres. Nevertheless, almost a minute elapsed before he reacted to it, at a distance of 1,661 metres, by stretching his body and gazing at it with protruding eyes. At this moment Onyx was induced to fly by a movement of the falconer's fist. He flew 100 to 150 metres in the direction of the lure, but then settled on a pole in order to preen himself and shake his feathers, which he did for about a minute; he then flew once more towards the lure, and began slowly to soar against an opposing breeze, reaching a height of some 300 metres.—On hot days all falcons seek the cooler strata of air, sometimes rising well above 3,000 feet.—Unfortunately three kestrels now appeared, and involved Onyx in a game which continued for some ten minutes; a contretemps familiar to every falconer. Fortunately the intruders made off. Onyx, now at a distance of 1,100 metres, did not accompany them, but looked about for a target, as Herr K—— could plainly see. Since at this moment the lure was not whirling, the

tiercel "waited on" about 30 metres above the falconer. But the moment the lure was in motion again he flew straight at it. It should be noted that although we threw the lure into the air several times, Herr K——, at a distance of 1,425 metres, could no longer see it even through the binoculars.

The results of these tests contain two figures of great significance. To begin with, they tell me that Irat was able to recognize a mark which to our eyes appeared to be almost motionless (pigeons) at a distance of 1,077 metres, while Onyx, under conditions of diminished visibility, was able to recognize a moving lure at 1,661 metres. Personally, I have no doubt whatever that falcons are able to see the feather lure or the living quarry at still greater distances. I shall therefore continue these tests.

Unfortunately Irat was killed when she had taken her sixteenth rook. There are always plenty of people who are imbued with the traditional prejudice that a bird of prey is a noxious animal. I wish a more enlightened opinion could be propagated by the schools and the Press, correcting this misconception, and seeing in such birds creatures intended by Nature to preserve equilibrium in the animal world. From this point of view our raptorial birds are useful members of Nature's household, and entitled to protection.—It should be realized that the quarry of the falcon is killed by a most expeditious method. The falcon breaks the second cervical vertebra of the rook, pigeon, or what not, and death is immediate. The shot-gun does not always kill so suddenly.

In my dealings with trained falcons I not only

found these birds most lovable creatures, but I conceived the greatest admiration for them. To begin with, I marvelled at the incredible range of their magnificent eyes almost more than at their teachableness and their attachment to their master. In the field you may see how the bird obeys a call or whistle, or flies at a visible mark, or hunts with a dog, when the latter ranges to and fro, and the hawk, "waiting on" above his four-legged friend, stoops on the quarry; and if you realize that the falcon can be employed for hunting purposes at a much younger age than the dog, and trained in much less time (for its training begins only four weeks after it is hatched, and in another eight weeks the bird can be successfully flown at a quarry), you will come to the conclusion that you are dealing with a highly intelligent creature. You may perhaps object that in systematic classification the raptorial birds come below the domestic fowl, the pigeon, etc. To this one may answer that the intelligence of an animal does not by any means always correspond with its place in the systematic classification. If it did, then all mammals would be more intelligent than the birds, which is by no means the case. Falcons, such Corvidae as ravens, jackdaws, magpies and jays, and parrots are intellectually superior to many mammals; and among the mammals the carnivora are more intelligent than the ruminants, and various genera and families of the monkeys, although they stand lower in the systematic classification. Of this I shall have something more to say in a later chapter. But first we shall ascertain how far our old house-mate, the Dog, can see.

6

HOW FAR CAN THE DOG SEE, AND AT WHAT DISTANCE CAN HE RECOGNIZE HIS MASTER?

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THERE is a very widespread opinion that the dog has not good sight. The owners of all breeds of dogs will tell you as much, and you may read it in zoological and cynological works. The fact is, that in judging the range of the dog's vision people have always interchanged, or rather confused, two different conceptions—the notion of *vision* and that of *recognition*, and this misunderstanding leads to serious mistakes.

When we see another person at a distance we cannot for some time say *who* the person approaching us is. Little by little we recognize by his figure and his gait that he is an acquaintance. He is still too far away for us to see his face. It is only when we recognize this that our suspicion is fully confirmed. Much in the same way we must conceive the dog's power of *seeing* and *recognizing*, and we must always bear in mind that in his case also two quite different faculties are in operation when he is approaching a human being.

It was in 1932 that I set myself the task of ascertaining approximately the maximum range of vision of various dogs, and also the distance at which they recognized their owner. Of the twelve

Plate 12. The Dog does not see the "Baiter.

Plate 13. The Dog sees the "Baiter."

Plate 14. The Dog rushes at the "Baiter."

Plate 15. One Quail is in front of its cage : the other has hidden itself under the straw in the smaller cage.

dogs tested eleven were sheep-dogs and one was a red setter. Three were so-called trackers; the others were trained to walk at heel. The oldest was littered on October 27, 1926, the youngest on June 8, 1930. In order to obtain answers to the two questions different experimental methods had to be employed, as will now be explained.

First I had to ascertain how far the dog can see anything at all.

For the solution of this problem I relied mainly on well-trained and intelligent dogs accustomed to walk at heel. Hitherto they had been set on at a maximum distance ranging up to 250 metres, and slipped after a running man, the so-called "baiter." For this purpose the trainer, kneeling beside the dog, with his eye on a level with the animal's eye, points with his right hand at the "baiter," while he holds the dog's collar tightly with his left hand, releasing the dog with a "Fetch!" only when he can assume, from the pose of the head and the direction of the gaze, and the general attitude of the animal, that he has realized what is required of him. On such occasions the dog usually whimpers gently, begins to tremble all over his body, and tries to tear himself loose, while his tail is tucked between his legs (Plates 12–14).

I proposed, beginning at 250 metres, to go up to the approximate limit of vision of individual dogs, working with both moving and stationary objects: that is, with the running and standing "baiter." We communicated with the latter by means of flag signals, waving the hat, and other optical signs, or by means of whistled signals.

The "baiter" had to proceed to his position by a detour, unseen by the dog. It goes without saying that the dogs were not allowed to follow the "baiter" with their eyes, so that they had to be concealed in the wood or hidden behind a bush during the preparations for the test—that is, until the "baiter" had taken up his position. It should be noted that if this precaution was not taken the dogs trained to walk at heel did not follow the "baiter" by scent, but only with the eyes.

It was soon discovered that the best results could be obtained only on perfectly level ground. The dogs failed to do what was required of them if the ground rose even as little as 32 inches (that is, above the level of their eyes) at an angle of 45° or over. On the other hand, such ground is quite suitable if the dog is looking in the opposite direction, as the dog is then running downhill and his sight of the "baiter" is unobstructed.

Hilly ground is the most unsuitable. If we set a dog on from the ridge of a range of hills which lies parallel to another range, in such a way that he is able to see a moving or motionless "baiter" in the valley lying between the ranges, or on the opposite slope, he will never succeed in reaching his destination, for there will always be ridges and hollows to confuse him, though to our eyes they may appear negligible. We selected a thoroughly suitable tract of land—by which I mean that it was perfectly level; and in most cases the dogs were tested in four different directions. No individual dog was allowed to run a second time in the same direction, as he might have retained

a mental image of the course. And in addition to running the dogs in different directions, we shifted our ground. How long a dog's recollections can persist will be shown in a later chapter, when the dog's ability to return to his home will be discussed. A dog must never be run *against* the wind. Unless the air was motionless the dogs were run in a following or lateral wind. I attached great importance to making the tests under different conditions of visibility—from a bright sunny day to a snowstorm. All distances were measured by the Zeiss machine-gun range-finder. Altogether I made thirty-four experiments with twelve dogs. The dogs all knew one another, and also each of the "setters."[1] By these tests of the range of the dog's vision it was shown that none of the dogs could see a moving "baiter" at a distance of 930 metres, or even of 900 metres. On the other hand, the "baiter" was plainly visible at 810 metres to the two dogs which gave the best performance. As far as I could judge—and my colleague independently formed the same opinion—the achievement of these two dogs was very near the limit of their powers of vision. After them came dogs which saw the "baiter" at 700, 625, 540, and 500 metres and less.

The question: "How far can the dog see?" can be narrowed down, on the basis of these experiments, to the relative form: "At what distance does the dog perceive a moving object?" For only such findings will enable us to compare the range of the

[1] All the tests were carefully recorded, with such data as time, place, and weather, and were published in the *Zeitschrift für Hundeforschung*, vol. 3, Berlin, 1933.

dog's vision with that of human sight, or will be of practical significance. In the absolute sense the question: "How far can the dog see?" cannot be answered; that is, as has already been explained in the chapter on "Falcons and Falconry," we cannot determine at what distance the dog perceives lifeless objects, such as mountains and so forth.

As appeared in the course of our further tests, the limit of vision varies in dogs of the same breed. Such individual variations were after all to be expected, but it was necessary to confirm them by experiment. It was not without intention that I had chosen dogs of uniform size for my experiments. In such dogs the height of the eye from the ground and the angle of vision was the same. A *Rehpinscher*, for example (a breed of terrier employed in hunting roe-deer), would not only be more seriously hindered by irregularities of the ground in reaching his destination, but would also encounter more obstacles to direct vision than a sheep-dog; to say nothing of the fact that the sight of the "baiter" would not excite him. If there were dogs no bigger than a mouse they would be able to see only a few yards at most.—My experiments are only a beginning. They should be continued, and in a downward direction, for if the breeds of medium size were tested we should be able to obtain comparative results, which, it goes without saying, might be of some practical importance.

The question: "At what distance does a dog recognize his owner?" calls for the employment of essentially different methods, and also an absolutely

different psychic attitude in the dog to that which leads him to seize the "detested" baiter. Here again we worked with moving and motionless persons, but the order of the experiment, and also the behaviour of the dogs during the tests, was quite different.

To begin with, I made experiments with a motionless person. Five persons were placed in line, at distances of three to five yards. Either they wore only trousers and white shirts or they appeared in ordinary clothing, with hats. The owner of the dog occupied a different position at each test—now on the right wing, now on the left, now in the centre, or in the second or the fourth place. The dog might be called only by one of the other persons, standing at some distance from him, as many dogs excel at following the sound of the voice, and are guided only in a secondary degree by their sense of sight. Before the five persons took up their positions the dog to be tested was led blindfold to a distance of 150 metres in the opposite direction, and placed with his back to them. The bandage was then removed from his eyes, and the moment the whistle sounded he made off without waiting for further signals. He had therefore to turn round before he could ascertain the direction of his owner.

And now for the moving person: Five persons came out of a thicket, without speaking, at intervals of not more than twenty paces, and entered a copse which lay at some little distance. (They were all dressed in ordinary clothing, and were wearing hats.) This proceeding could not escape the dog's notice. He was held by the collar at a fixed distance from the procession, and could run straight to his

owner. In this test no whistled signal was given; the optical stimulus produced a sufficient reaction. Just as in the experiment with motionless persons, the owner of the dog varied his position in the procession. If a second thicket was not available, so that the field of operations gradually became familiar to the dogs, the five persons emerged from the wood in single file, described a semicircle, and then disappeared into another part of the thicket, about twenty yards from the spot from which they had emerged.

As we ascertained in the case of stationary persons, the dog's faculty of recognizing his owner at a given distance varied greatly in individual dogs. The distance was at first 100 metres, and then 150. The former distance proved to be too small for some of the dogs, and the latter much too great. The best performance in this series of tests was the recognition of the owner at a distance of 110 to 115 metres; and this record was made by three dogs. It was surprising to note that one dog failed to recognize his owner until the distance was reduced to less than 10 metres. But this phenomenon is by no means rare in everyday life. As I have often observed in the street, many dogs do not recognize their owners even at this distance if other persons are near them.

In these experiments, and also, now and again, in the tests for range of vision, there were two factors which exerted a considerable and undesirable influence. One was the recollection of a course already covered, and one was the faculty of localization; by which I mean that many dogs were guided by the sound of the signal and not by the eye. Both factors may be a source of error, especially in

the tests for recognition and the valuation of results. Of this the experiments just described afforded an excellent example. If a dog found his owner the first time he followed exactly the same course the second time, although in the meantime his owner had changed his position; and he recognized his error only after he had run a considerable distance. Perplexed by this mistake, he pulled himself together for the third test, which he carried out just as well as he had the first.

The tests with moving persons yielded a record performance at 150 metres, which was accomplished by only one dog. A second dog recognized his master at 130 metres. Last of all—with 10 metres—came the dog which had not recognized a motionless person until he was within 10 metres of him.

To all appearances, then, dogs have a good power of vision and also the power of recognition at a fair distance. This was clearly demonstrated by the tests just described.

Retrospectively, one may say: From both series of tests it emerges that the dog's performance is better in respect of moving persons than in respect of stationary persons. Thus the results of the tests are in complete agreement with our own experience in the open. The dog recognizes its master first by his figure and his movements—that is, his gait. The face is recognized only very much later. On the other hand, we found that a dog recognized its master when it could only see his face in profile, or even when his features were invisible, because averted, or hidden by the brim of his hat.

Finally, it should be remarked that there is a

great spatial difference between seeing and recognizing. How great this difference may be is shown by the example of the dog which held the record in each series of tests: 810 metres for perception, 150 metres for recognition.

If we consider the behaviour of the dog in these two cases, it is seen that the psychic state and the intellectual processes of the dog are quite different according as he is being incited to run at a "baiter" or to reach his owner. The "baited" dog is in a highly excited state, and herein resembles his cousins the fox and the wolf. The hunting instinct of the formerly wild beast of prey still persists in the dog. Indeed, I have remarked, in the shrill howling tones of the "baited" dog, a similarity to the ordinary hunting cries of the fox, though more in the rhythm and pitch than in the timbre of the tones. It is noteworthy also that on reaching the "baiter" the dog tries to circle round him in the manner of the wolf.

That even imperceptible undulations of the ground will prevent the dog from reaching his destination is surprising. As we have already hinted, the animal's affectively-toned haste may be partly to blame. But quite apart from this, the dog has no faculty of combination or constructive thought. Also we see that he does not, in this case, as on other occasions, quietly proceed to take his bearings. Whether the dog ever needed this faculty as a wild animal is questionable. For our beasts of prey, and in particular the wolf and the fox, hunt as close to their quarry as possible, and if the first attack miscarries they stick close to their victim's

heels. Thus their senses are always in close contact with their victim.

In the test of recognition the dog, having been separated from his owner, is concerned to rejoin him as quickly as possible. In this case also he betrays excitement. But this has no similarity to the innate instinct of the chase which was once a special characteristic of all dogs. The dog obeys his devotion to his master, which is partly inculcated by training, and partly emotional. This, of course, is evident in the tests for recognition of a moving person, when the dog does not have to run in response to the accustomed whistle.

Finally, these experiments have established something further: These tests give the dog very great pleasure; he is absolutely heart and soul in the business when he is brought to the field of operations. Any dog prefers some sort of activity to lying idly on the ground. No other species of animal—chimpanzees and other apes not excepted—works with so much zeal, willingness, and emotional intensity as our four-footed comrade. In this case he is actually our collaborator.

7

QUAILS IN THE WINDOW

★

In the last years of the war, and the first few years after its conclusion, one might hear the cry of the quail in the environs of Munich. At present, however, these birds have disappeared, here in Solln as in other places on the outskirts of the city. You can hear them now only in their cages, unless you live in the open country, or seek them there.

Not all quails are kept as they should be. In most cases their head and tail feathers are badly battered; and it was such a bird that was brought to me at the end of March last year. I understood that the bird had already passed through many hands. Hence it was very timid, and also unusually silent, although it was a male bird. In order to sweeten his captivity I endeavoured to procure a mate for him. Since I could not hear of one, I accepted, though with many misgivings, another male bird. He was larger and handsomer than mine, and in good condition, and he gave voice directly one spoke to him. About five o'clock every morning, too, he delighted me with his lovely call—the mating call, which was preceded by a deep, monosyllabic note several times repeated. This was a sort of overture. The bird uttered the same note in the evening, but did not then follow it by the call; and so he continued as long as I had him.

The first encounter between the two male birds passed off just as I had expected. Quail No. 1, as the person already in possession, pecked at Quail No. 2 and drove him away. No. 2 fled, but repeatedly attempted to approach No. 1 in a friendly manner. No. 1, however, remained inexorable; he seized his comrade by the crest and pressed him to the ground, still gripping with his beak, until I came to the rescue. If the two birds heard an unfamiliar sound they stretched their necks vertically and laid their heads a little on one side, as all gallinaceous birds do, but this was only a temporary attitude. When the alarm was over the second quail had still to be just as cautious as before. Here again, then, we have the relation of the despot to the suppressed victim. This relation, however, as I have learned from my many years of experience with hundreds of domestic fowls, does not inevitably persist. But any bird, whether cock or hen, on making its first appearance in the poultry-run, is pecked, first by the cock, but afterwards mostly by the hens, with the result that the stranger, unable to find its bearings, creeps about in a depressed and dispirited mood, as I have described in the chapter on "The Poultry-Run."

On the other hand, as I have indicated, there are exceptions, when matters follow a contrary course. The downtrodden creature pulls itself together, often in the course of a few days, but sometimes only after weeks or months, and then, if it is a male bird, and conscious of awakening strength, announces to the cock that it is ready to fight. Indeed, in one case a cock of one of the

smaller breeds (a Bavarian) killed one of my heavy Cochins, flying on to his back and shattering his brain-pan.

In the case of my quails also the unhappy relation was reversed: the oppressed became the oppressor. And since the quails are among the most quarrelsome of all the Gallinaceae, I had to devise some means of separating my new housemates. I made room for the first-comer in the bay-window, where I placed a cage with two doors and a wire roof. Unfortunately the bird often flew up, breaking still more of the feathers on the top of his head, so that I gave him another cage with a detachable roof. Now he ran in and out of the two doors as before; he bathed every day, in water and also in sand, and further, when the sun was shining, indulged in a thorough sun bath. Although he could at any time have flown from the bay-window into the room, he never did so by daylight. But when twilight fell he flew to the farther end of the room, and allowed himself to be caught and caged. The cage was then placed on a chest and covered with a cloth. Next morning I moved the bird, with his cage, back to the bay-window. After this the bird always flew on to the chest as soon as twilight fell.

When the second quail arrived, on April 5th, I put him in the larger cage, with its fixed roof. This quail was a regular cage-bird; he was in good plumage, and the feathers on his head were immaculate; he never attempted to fly against the roof of his cage, and to all appearance had long been cured of the habit of doing so.

In order to put an end to the constant hostilities

between the two birds, and yet by turns to give them freedom of movement, each was released from his cage for a few hours at a time. Either I opened the doors of the roofless cage, so that the oppressed quail was free to come out, or I began by liberating the tyrant. In either case the birds behaved quite differently. One peculiarity was common to both: neither bird left the bay-window by daylight; in the daytime each bird was a voluntary prisoner. If the tyrant was released he usually went round the other bird's cage, in a threatening manner, trying to peck at the prisoner through the bars, but he never made the least attempt to fly in through the open top and fall upon his enemy. (The inmate, by the way, showed no uneasiness, but kept to the middle of the cage.) But when the hour of liberation struck for the prisoner the tyrant was shut into his cage. When twilight fell, and both birds were set at liberty, they flew on to the chest and allowed themselves to be put into their cages, which were placed side by side and covered with a cloth. If, however, I kept them apart—that is, if I carried one of them, in his cage, back to the bay-window—they called to each other until I put them together again (Plate 15).

Once I took them into the garden, placing each in a large aviary. Here they flew to and fro in alarm, battering their plumage, including their head feathers, so I took them back to their window. Here they were at once quiet and cheerful.

The behaviour of the quails is so peculiar that it sets us thinking. Two birds of the same species and the same sex, coming from different bevies,

apparently of the same age—that is, barely one year old—were restricted, at first by compulsion, as a result of their life in captivity, to an environment which for a winged creature was absolutely tiny, and were quite happy and content in it; they bathed, in sunlight and in water, ate when they felt inclined, and very often emitted sounds indicative of content. They also scratched eagerly in the manner of the domestic fowl, but without glancing at the floor as they did so. This scratching, like their pecking, was quite mechanical; for in reality they were pecking at nothing, as it was only very rarely that a grain of corn was spilt on the floor. They were given their food in their own private food-tins, and anything they happened to throw out as they were eating found its way at once into their beaks.

Their whole existence was passed on a surface of only 16 *square feet, and these two-dimensional limits were fixed by the birds themselves.* During the day they never thought of escaping by flying upwards; only towards twilight the instinct to seek refuge in the darkness, to take cover, was awakened. Here an ancient and universally compulsive instinct of the animal was operative—the instinct to seek the accustomed sleeping-place. Now all enmity was forgotten. The rhythm of life was contracted to a minimum, as is possible only in an animal that is living in captivity. Sixteen square feet of surface was the world in which these birds were living, whose brothers and sisters migrated year after year to Egypt. Strangely enough, their language suffered hardly at all. They conversed all day quite

eagerly so long as they were both confined, and the cages were put together so that they could see each other. And the number of sounds at their disposal was by no means small. According to my experience of them, the quails are second only to the domestic fowl in respect of language. They have special sounds to express fear, alarm, surprise, and a characteristic cry of anxiety when they are caught in the hand; and one hears also a faint, undefinable, confused murmur of voices, which cannot be imitated, as it is hardly perceptible to the ear. It is a sort of gossiping with closed or nearly closed beaks. Then there is the call-note, and from time to time a loud love-call, as well as the ordinary cry of the quail. The quail has a peculiar habit of throwing straw over its back and hiding under it. It was often difficult to tell what part of the cage the bird was in, so completely did the straw conceal it. Once the birds had covered themselves thus they would remain hidden for an hour or more, lying close against the ground with their legs tucked in.

This life in the alcove reminded me, in its voluntary confinement, of the case of three goldfish which I once possessed. The aquarium in which I kept these fish was 40 inches in length, but it was divided by a partition into two sections which were respectively 10 and 30 inches in length. In the smaller division I generally kept a few insect larvae, such as that of the Cybister and other beetles. When I gave up using the smaller compartment, and removed the partition, the fish behaved as though it had still been present; that

is, they swam the traditional 30 inches to and fro, without attempting to go any farther. Their rhythm was once for all attuned to this and not to a greater space.

The joyless, if not absolutely distressful existence of the animals in a small menagerie must seem pitiable to any lover of animals. Completely inhibited in their freedom of movement, when travelling from place to place they often lie in their own excrement, sometimes without light, more wretched than even the most persecuted of their fellows in a state of nature. Hence their dismal appearance, their dejected gaze, their state of psychic depression.

Everyone who has kept animals knows how deadening and enervating to the senses and the spirit of an animal captivity can be. The same inadequate, monotonous cage, which shuts the animal away from its natural environment, condemns it to absolute passivity, and generally ends in extinguishing all real emotional values—and the terrible monotony of movement, the pacing to and fro before the bars! This spatial restriction abolishes the animal's natural mode of life. Here there is no refreshing struggle, no search for food, no wooing of the mate.

How greatly restriction to a limited space, even in the open air, may alter the very character of an animal is demonstrated by our watch-dogs. Snappish and hostile in their attitude even to their housemates, they lapse into a visible apathy, and exhibit all the symptoms of a psychical degeneration.

What we have said here of the captive life of animals must not be understood as referring to the

cage-bird born in captivity. Such a bird has become perfectly accustomed to its limited environment. It is able to pair in season, it has a sufficiency of good food, and it does not in the least feel its loss of freedom. If it happens to escape it returns of its own accord, or takes refuge with other human beings. It actually prefers its own little environment to a larger one.

8

IN THE TREE-TOPS—AND BEHIND THE STOVE

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In July 1932 Professor Hans Krieg, Director of the State Zoological Museum in Munich, sent me a small and particularly delicate Howler Monkey. He was called Guapo—which means "the Beautiful" —and was then about nine months old. Unfortunately, the little monkey was ill; he had made the long journey from South America to Munich—for Professor Krieg had just come home from the Gran Chaco—and had spent the months of April and May on the Bavarian tableland.

The experts all assured me that Howler Monkeys live only a few weeks in captivity, even in the zoological gardens of their home, though these lie in the same latitude as the Gran Chaco, in which province was Guapo's native tree. The little monkey did not appear to have a good expectation of life. Still, I decided that I would do what I could for him, and as you will see I had no reason to regret my decision.

The very first thing I did was to put the monkey in one of my trees. Here he had light and air, and food also if he cared to take it; here his natural instincts would be awakened; and here he recovered himself. His health improved slowly but steadily, and he gradually grew out of his apparent stupid-

ity. In the spring, summer, and autumn he lived principally on leaves, young shoots, and fresh fruit as it ripened; while now and then he would eat a fig or a banana, and he drank milk every morning and evening. Altogether he completely stripped two of my fruit-trees—he was always free to move about, and never chained—but he also ate beech- and birch-leaves from time to time. Bean-leaves and strawberry-leaves too were eaten with great relish. One moment he would be in the breezy tree-top, next moment amidst the vegetable beds. He never left the garden. He remained always attached to his home and the family.

His thick, prehensile tail served as a fifth hand. He never moved from bough to bough without first anchoring himself with his tail. As a rule he would hang head downwards in the tree, and he even ate in this position. It might happen that he would begin to climb higher in the tree without first releasing the grip of his tail. At such times he would pass the tip of his tail, just as a climber may pass the spot where his rope is fastened. At other times, having secured himself by a lateral anchorage, he would sit meditating in the topmost boughs of the tree, without eating, now gazing upwards at a bird or an aeroplane, and now looking down upon the human and canine passers-by. If one watched his tail take hold of a branch, one had the impression that it was a completely autonomous organ which functioned quite independently of the rest; for example, it would reject a slender twig and accept one which would bear its owner's weight. In so doing it had no such help from the eye as our

hand receives in the action of seeking and grasping. Even when Guapo was on the ground everything that came into contact with the tail was grasped by it: a walking-stick, a shoe, a pair of spectacles on the desk, or what not (Plate 16).

Thanks to his active life in the trees, Guapo's mental faculties were gradually awakened, and he began to play, at first overhead among the boughs. He would hang by his tail and twist his body upon its axis until it could go no farther, but had to revolve in the opposite direction. In technical words, his body was a torsion pendulum. Java and Mako, my Meercats, played the same game in a different way. When I fitted up a swing for these two monkeys, hanging the seat by four cords from the roof of their cage, they twisted the seat in one direction until it would turn no farther, and then released it, allowing the cords to return to their original position. This they did again and again.

Another game of Guapo's was to let himself fall through the boughs of the tree. First he would swing his whole body to and fro, while his fingers were widely outspread. Suddenly his tail would relinquish its hold, and the monkey would throw himself into the branches beneath him, grasp them with his hands, and anchor himself somewhere with the noose of his tail. He would turn his own body into a torsion or an oscillating pendulum.

He never went into the garden if it was raining, nor would he go out in cold weather. But even late in October, if the midday sun was shining warmly in the tree-tops, the monkey was always ready for a climb. In the first place, of course, it was I who

Plate 16. The Howler Monkey, firmly anchored by his prehensile tail, watches the passers-by with interest.

Plate 17. Guapo plays with his fingers as little children do.

Plate 18. Coloured Plate of Celery and Carrot ; the latter is Guapo's favourite vegetable.

Plate 19. Guapo is interested only by the Carrot.

Plate 20. And tries to seize it with hand and mouth.

decided whether he should or should not go out. The climatic change from the Gran Chaco to the temperature of our home was one to which even the most adaptable of animals could not at once become accustomed. But in the two following years the completeness of Guapo's acclimatization was astonishing. It was remarkable to see how sensitively he reacted to harsh winds and cold rainy weather. He had only to go to the door and look out, and his mind was made up in an instant. Off he went—or back he came; there was never a moment's hesitation.

With the gradual approach of winter the little Howler Monkey finally exchanged his arboreal existence for a warm spot behind the stove. Here he was really comfortable. Now there began for him an indoor life which was organized by the monkey himself; it was orderly, yet full of variety. We human beings and the dog were his playfellows, his pastime. Whether he regarded us as human beings or as big monkeys it is impossible to say. He came of a great kindred, and his attitude to one branch of it was innate. We, for our part, had to accustom him to the most necessary conditions of a civilized and healthy life: we had to teach him sanitary habits. Indoors he could no longer do as he had done in the tree-tops. Curiously enough, it was not very difficult to accustom him to an appointed place; and this is saying a good deal. To be sure, one can train Capucin Monkeys to be house-clean, but not Meercats, to the best of my knowledge, and as far as my own experience of them goes; nor even anthropoid apes. First of all,

one had to ascertain the time of Guapo's evacuations—those of the early morning and late evening were of course the most regular—and then, as in the case of little children, one had to look for the definite signs which precede the passing of a stool. Gradually the little monkey would of his own accord ask to be let out, and a year later he even opened the door for himself. This was quite a business, for he had to climb up on to some article of furniture that stood near the door—a small table, a pedestal, or whatnot—and then, feeling for the latch with his tail, let himself fall, opening the door by the weight of his body. It will be seen that he had applied the old trick of his arboreal life—letting himself drop—to the opening of a door. When he had opened it he sought the place allotted to him for relieving himself.

Guapo loved the sight of the open fire in the stove, and its radiant warmth. Even before he had eaten his breakfast he would seat himself, with uplifted arms, in front of the stove door, which was opened for his benefit, while he emitted gobbling sounds in token of his inner satisfaction. When his body was sufficiently warmed he proceeded to eat his breakfast. In winter this consisted of rice boiled in milk, cabbage-leaves, Brussels sprouts, and other green stuff. He was excessively fond of carrots, but would have nothing to do with celery and parsley—of which more anon. He ate in meditative fashion, picking up this and that, always choosing his food, and eating it in a certain order, so that one could tell at a glance what he preferred and what he disliked. After his breakfast he would climb on the

stove and seek out the warmest place at the back of it. There he would gradually fall into a doze, and then neither man nor beast could attract his attention. He seemed to be dreaming with open eyes. After perhaps half an hour he would move and look quickly about him, and then he would let himself go. He would scamper across my writing-table, seizing with his tail a bundle of letters, a sheaf of manuscript paper, my spectacles, the blotter, a stamp-box, or other object. From the writing-table he would make his way to a tall book-case. Having climbed to the top and anchored himself, he would pull out various books at leisure, and throw them down, one at a time. This was done with a deliberation and absence of excitement which contrasted strongly with the haste and unruliness of my other monkeys; he gazed with interest after each book as it fell. Of course, he could not be allowed to continue such pranks, and his gymnastic exercises on the curtains were equally undesirable. Really everything he did was forbidden, so now and again he had to be carried back to his nursery, where there was nothing that he could break or tear. Every one of my pets had to be confined thus at some time or other, whether monkey, marten, heron, or what not.

Among my animals Guapo had only one friend: Ali, my dog. Ali was so good-tempered that he would let the monkey tug at his ears and pull his tail, but he would not allow Guapo to poke his fingers into his nostrils. Monkeys notice everything, and everything has to be handled and fingered. But no matter what Guapo did, the next moment

Ali would lick his head and face, and presently they would both be lying together on the carpet, snuggled against each other and dreaming. Sometimes Guapo goes into another room, where he can find a substitute for his games in the tree-tops. Here he scales a set of shelves and lets himself drop on to the sofa, up the back of which he climbs over and over again, and leaps on to the soft cushion. A frequent gobbling indicates his inward satisfaction. Then he returns to me.

If I sit down before my typewriter, next moment he is clambering on to my shoulder. For a time this situation is bearable enough, except that one has to hold one's head on one side, in order to make room for the monkey; but it becomes alarming when he knots his tail round my neck. Now he has caught sight of the lady of the house. She is wearing a comb in her hair. This attracts him at once; it is loosened and disarranged, but everything is done without haste, and he cannot endure haste in others.

There is a clatter of plates in the dining-room; the table is being laid. Here the whole household assembles, Guapo with the rest; here at last we sit down and eat in company. Guapo opens the door of the dining-room in the manner which I have described, goes to the door at the opposite end of the room, which leads into the corridor, wanders into the kitchen, fastens on to the maid's apron, returns to the dining-room, and again goes out with her, and returns, hurrying to and fro between dining-room and kitchen until everything has been brought in. Then, sitting in my wife's lap, he lays

his little hands on the table. First of all there is a small bowl of soup for him, which is placed on the floor. He must not have meat, but uncooked fruit is good for him. Cooked cabbage is an occasional titbit. He behaves really very well, and eats quite cleanly; nothing ever falls out of his little mouth. He would like best of all to come to us in turn and take a titbit out of each person's mouth, but this is not permitted. The maid, however, has allowed him to do this, so now and again he goes out to the kitchen to seek her, especially when there is macaroni, which has a great attraction for him.

Sometimes I take a little rest at noon. Guapo sits at my head, touches my eyelids with his finger-tips, like a child, places his face close to mine, and breathes at me. If I take no particular notice of him he pounces upon me suddenly, rounding his lips and rushing at me with a barking sound. When he does this he looks extraordinarily like a child.

I have never known a monkey which needed to be caressed so constantly as Guapo. The absence of even a single member of our family of three makes him uneasy. If we are all absent for more than a couple of hours he becomes ill-tempered. On our return he expresses his delight by climbing up us and embracing us in turn, putting his arms round our necks and pressing his little head against our cheeks, while emitting smacking and gurgling sounds. Once, when we were absent for four hours, he began to weep; the tears were still standing in his eyes when we returned. This is remarkable, for if one asks the keepers or directors of the zoological

gardens whether a monkey can weep they will always reply in the negative. At all events, none of the monkeys in the different zoos have ever wept hitherto.

Guapo's mental development was slow, as I have indicated. Sometimes it seemed to me as though his whole psychic development had suffered a sensible interruption, and as though he still had to pass through individual stages which should have occurred earlier.

His teeth must have given him some pain, for he would put pencil-shaped scraps of wood into his mouth and bite on them like a teething child, or he would even use such a piece of wood as a rasp. He made frequent use of a tooth-file which I obtained for him, and it seemed to give him much pleasure. About this time—in his first year—he showed a great partiality for red and blue crayons, and he also drank ink if he could get hold of it, so that I had to keep such things carefully out of his reach. (I have often noted such tastes in children—and in particular, the drinking of ink.)

One of Guapo's most peculiar habits, which I have never observed in any other young monkey of whatever species, was his way of playing with his fingers. Lying on the table, he would move first one and then another finger of one hand (usually the right), and follow these movements with evident interest, as a child of eight to ten weeks will do. According to various psychologists, such movements are to be interpreted as a discovery of self; the child itself is the originator of such movements, and also the recipient of the sensations evoked by them: that

is, of the sensory perceptions. This habit made its appearance in the monkey's second year (Plate 17).

In other respects Guapo's interest in play was not very extensive as compared with that of my other monkeys. For example, the sight of a rolling ball left him quite indifferent.

In January 1933 I made experiments with a view to ascertaining how the little Howler Monkey would react to coloured pictures of plants and animals. I laid before him various illustrations of plants both familiar and unfamiliar, and also of single leaves and fruits, such as apples and pears. He immediately grasped at the pictures, and tried to remove the larger leaves and fruits: that is, he repeatedly stretched out his hand to them, and closed his fist against the paper, as one could plainly hear. As his attempts to grasp the objects were unsuccessful, he bent down over the fruit or leaf in question as though he wanted to tear it loose with his jaws. At last he began to lick the pictures. He took no notice of a picture of shepherd's purse.

In the following summer I showed him a coloured plate from a botanical work on which were portrayed two plants which were familiar to him: carrots and celery. He immediately fixed his gaze upon the carrot, his favourite vegetable (but not on the celery, which he always refused), and tried to pick it up in his mouth (Plates 18–20).

Guapo is incapable of understanding the difficult tests which I have set various other monkeys; for example, he is not nearly as clever as the Macaques. He cannot even open the lock of his cage in order to escape.

In respect of strangers Guapo observes a policy of "wait and see." But once they have won his confidence he soon goes up to them without the least misgiving, or even climbs about over them. If we are sitting in the shadow of a tree with old acquaintances Guapo will suddenly appear above our heads. Anchored by his tail somewhere in the branches, he swings to and fro over the coffee and cakes, but as a rule he is so abundantly supplied that he has no need to reach towards the cups and plates.

A conspicuous characteristic of Guapo's is his sensitiveness. If one denies him anything that he wants, or threatens him with punishment, or takes him to his sleeping-box before the usual time, he soon shows that he does not bear his name in vain. His howls become so shocking that one is glad to give way to him. If one does not comply with his wishes he has a convulsive fit of crying, like the crying of a child. At such times one may hear, amongst others, sounds like the squalling of excited cats and the squealing of pigs.

Once he has his way his excitement quickly abates. The tempest of emotion is followed by a calm; he embraces us, presses his little mouth caressingly to our cheeks, and is once more what he was before the crisis, a good and lovable if somewhat wayward monkey-child.

9

TROUBLESOME MONKEY-CHILDREN

★

Is it not a remarkable thing that all of us, old and young alike, take a great interest in monkeys, yet do not combine with this interest a commensurate sympathy? We are attracted to monkeys by their drollery, their diverting games, their comical disputes, their fabulous agility, which puts us in mind of an accomplished gymnast, and which even training cannot increase. On the other hand, we are astonished by their likeness to humanity, and readily perceive parallels in their behaviour.

Where else in the animal kingdom do we see this expressive play of the features, this shell-like ear, so like the human organ, so unlike the pointed ear of the other mammalia, and so characteristic of the simian face?

Their hands are not merely employed, with astonishing skill, for climbing, but also for grasping the minutest objects, and the occasional erect gait of the higher apes always produces a lasting impression on the beholder, particularly when it is combined with a dance.

Undoubtedly there are many persons to whom the monkey is highly unsympathetic. And it is a fact that the general notion which is held of the monkey —above all, in the judgment of the European peoples—is not precisely favourable. As a rule the

word "monkey" is applied as a term of abuse, never as a flattering appellation. It always expresses something negative, disadvantageous, inferior: human defects and weaknesses, a puerile or effeminate character, maliciousness, ugliness, giddiness, and vicious tendencies. In our literature the monkey seldom shows to advantage; he is never taken seriously; he is never a symbol of virtue, and only by exception does he figure in heraldry. Man cannot endure to be compared with the monkey; he is diminished by the comparison, and the monkey does not gain in stature.

Mako and Java, as I called the two monkeys which came to me, by way of Hamburg, from a Javanese forest, were still little children on their arrival, and even in their travelling-cage gave signs of their lively temperament. Despite every precaution in opening their cage, they slipped out of their restricted quarters more swiftly than I should have thought possible. Next moment they tore shrieking up the curtains, ran along the curtain-pole, and finally sat grinning at each other, one at either end of the pole. Now came the difficult business of catching them. Two pictures had already fallen from the walls, and the big mirror began to rock. An outstretched hand was greeted with gnashing of the teeth and menacing leaps into the air.

But finally human guile was victorious over simian cunning. In the cage their behaviour was at first ungovernable. By no means everything that a good workman had described as immovable withstood their assault. The strength of a young

monkey is not to be despised. As a rule one is not prepared for the way in which the monkey incessantly shakes the bars or wire netting—until enough nails are loosened to allow of his escape.

One day they had both broken out of their cage. They fled across the gardens, from tree to tree, until they came to the little woodlands about Solln. These woods—and above all, the fruits of the orchard trees—must have reminded them of the virgin forest and the plantations of their home. No wonder the monkeys roamed about them for several days, to the amusement of all and sundry. I myself was away at the time, but I learned that Mako, the male monkey, had returned of his own free will. He entered the garden from the meadows and was enticed into his cage by a well-filled plate. Java was at first given up for lost. But after my return I was told, one morning, that she had taken up her quarters, not far away, in the loft of a summer-house. Her discovery came about in a singular way. The tenants of the property in question noticed that for a number of days in succession the milk delivered in the morning was far below the proper measure. They complained to the milkman, but he assured them that the jug which he found on the front doorstep had been filled to the brim every day. This put them on their guard, and they lay in wait for the thief. But instead of a human thief it was Java who appeared. She drank half a tumbler of milk out of the jug, which she held in both hands, and then climbed back into the loft over the summer-house. I was at once informed of the monkey's hiding-place, and had not much difficulty in secur-

ing the little Java. To my astonishment I found that she had been collecting fruit in the loft, and had stored it in a couple of boxes.

The joy with which Mako and Java greeted each other was unforgettable. Their protracted and repeated embraces, accompanied by vivacious chattering, afforded me a rare spectacle of animal emotion. Subsequently, even after briefer partings, this behaviour was repeated. But Java always took the initiative in such caresses. She loved Mako; nevertheless, she did not hesitate to punish his malicious tricks and sly attacks by biting him and pulling his ears; but when he howled with pain she was quick to caress him again.

Their games might continue for hours without a moment's interruption. Their activity was almost incredible; but despite the great agility of their movements, and a corresponding expenditure of energy, they never grew tired. If by any chance there was a momentary truce to their scuffling—which, for that matter, was like the romping of healthy children—one or the other would leap into the air on all fours, several times in succession, much as young foxes, martens, lambs, kittens, and other animals will do, but with the difference that the elasticity of their movements reminded me of the bouncing of a rubber ball. But unlike the bouncing ball, their physical energy seemed undiminished even after four or five such leaps into the air.

Games of movement were predominant, whether the monkeys were playing in their cage or in the trees in the garden. In the trees they surprised the observer by their horizontal leaps, and their rapid

ascents, using one or both arms. Another game of movement, in the stricter sense of the term, was played by each of the monkeys: like kittens, they ran after their own tails, crying out loudly when they caught them. It was only as a result of such a chase that they became aware of the ownership of this appendage, and refrained from further assaults upon it.

In my opinion these games of movement are the origin and basis of most other kinds of play. No theory can afford to overlook this. And I have a special reason for stating this opinion in connection with the play of my Macaques. As will be seen, I did not condemn these two monkey-children to a dreary life in captivity. To a very great extent they continued to live in freedom, so that their play-instinct was able to develop unchecked.

These monkeys took an evident delight in splashing and washing themselves. They would strike violent blows at the surface of the water, throwing it out of the basin, eagerly watching the drops of spray, and rejoicing in the success of their exertions; or they would sink their hands under water, forming a sort of cup, in which they tried to lift the liquid. These occupations, like their attempts to seize the jet of water issuing from the pump, verged upon a playful experimentation. But the Macaques would often allow the water to run through their hollowed hands. Here there was no question of active play, but merely of the enjoyment of a pleasant sensation. Almost everything, edible and otherwise, was washed; scraps of cloth, handkerchiefs, veils, etc., and Java would even rub

the articles with her hands, as a washerwoman would do, rinse them by trailing them to and fro in the water, and hang them over her perches, or fasten them to the grille of her cage. It would be humanizing the facts were we to regard this hanging up of washing as a conscious activity. Why Java should have taken more interest in washing than Mako I do not know. In any case, it is hardly permissible to regard this interest as a definitely feminine trait.

One special variety of play consisted in draping or bedecking the person. According to Köhler's observations, chimpanzees in captivity will drape their bodies with all sorts of things—lengths of cord, scraps of cloth, bits of creepers, etc.—and show themselves off with playful importance or arrogance, so that one is inclined to perceive in such behaviour a naïve and complacent enhancement of the "sense of one's own body," such as is often enough observed in human beings.

According to my experience, such forms of play are by no means confined to the anthropoid apes. Mako draped himself and his sister with trails of runner bean and pumpkin vines, bits of packthread, and so forth; Java was fond of donning a veil, which she would pull far over her face, and thus adorned she would walk about the cage on her two legs, or clamber up the grille. Sometimes one of them would drop an empty jam-tin over his head, or hold a rag in front of his face, and strut past the other with a majestic gait (Plate 23).

When Mako was still small he did not find it easy to don such a head-covering. But the efforts he

expended in order to achieve his aim will appear from the following: One day, having found an empty paper bag, he tried with both hands to press this on to his head, but as his arms were still too short for this purpose he could not get it on farther than his eyes. However, after many attempts, which were continued for perhaps ten minutes, he was at last successful. But since the bag immediately fell off his head, he spread it out carefully on his little bench, smoothed it with his hands, and repeatedly stood on his head on the flattened bag. Each time he was visibly surprised that this method was not successful. Now he pressed it with his hands against the top of his cage and pushed his head against it. This he repeated several times. When I gave him a new bag he held it at first in front of his face, but then again made an attempt to pull it over his head.

Noise of various kinds played a very considerable part in the play of these monkeys. Not infrequently they amused themselves by carrying jam-tins and other metallic objects up to their perch, and letting them fall over and over again. Or they would strike an old saucepan with a spoon, as a drummer beats his drum, or knock a stone against their milk-dish, and so forth. Both Mako and Java, like the Meercats and other monkeys, were very fond of making what I may call playful experiments. For example, my Macaques attacked an "untearable" picture-book tooth and nail until it was in tatters. Also they would pull boxes, baskets, mechanical toys, etc., to pieces. It is difficult to say how far they were actuated by curiosity in doing such things, or

inspired by the satisfaction to be derived from "being the cause" of something, from perceiving the result of their efforts, or whether a destructive instinct was responsible for such performances; in other words, whether they were actuated by such motives as we assume in the case of our children when they are playing.

Playful experiment led the monkeys to open the latch of their cage and the catches of windows, and to make all sorts of useful discoveries, which were then properly utilized (Plate 24).

A typical example, which shows how playful experiment may lead to a discovery which has a practical application: Having observed that my Macaques were able to climb up and down even lengths of thin twine which were fastened to the roof of the cage, I hung up a long but very thin chain in the cage, in order to see how the monkeys would deal with it, merely as gymnasts. As a matter of fact, they promptly climbed up it until they were stopped by the roof. A little while later (in the meantime I had been called away) I noticed that the monkeys had made themselves a swing. In order to do this they had to fasten the lower end of the chain outside the cage; indeed, as presently appeared, they had hooked a link of the chain over one of the many upward-pointing cut ends of the wires forming the grille. In order to see with my own eyes how the monkeys had contrived to fasten the chain in this way, I hung it up again and waited, unobserved, for further developments. After about a quarter of an hour they proceeded to restore the swing, and since they could not see

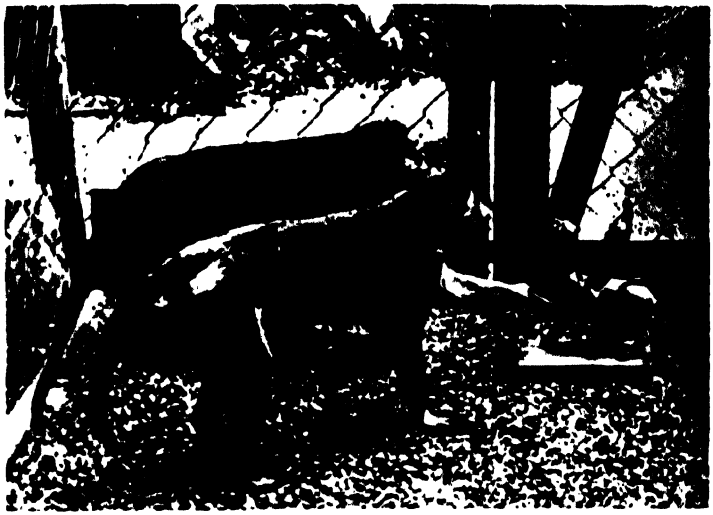

Plate 21. Mako and Java gradually approach the bronze statuette and grasp the tiger's uplifted paw.

Plate 22. Inquisitive but alarmed, the monkeys gaze at the snake, holding before them as a shield the lid which Java has seized.

Plate 23. Sometimes one of the monkeys will clap an empty tin over his head, and creep towards his comrades with an air of playful importance.

Plate 24. Java pokes his fingers inquisitively into the eyelet-holes of the shoe.

the place where they had to fix the chain—namely, on one of the cut ends of wire—they had to rely on their fingers and their sense of touch. As often as I took it down, so often did they restore the swing. The attempt was not always immediately successful; sometimes they could not find a convenient spike, and then they threaded the chain through several meshes—weaving it into the grille—until they at last succeeded in finding a point of support.

I am quite willing to assume that the first result was due to chance; on the other hand, the monkeys were able to learn from their unforeseen success. And so a game ended in proceedings which point in the direction of animal intelligence.

A Meercat (of the yellowish-green variety) which I acquired out of compassion, and which had already been sent away by three previous owners, had an extremely playful temperament. Anything pleased her as a toy, but as such it was always destroyed. Her chief playmate, however, was one of my dogs. Their games usually took the form of skirmishing about and catching each other—in short, of scuffling; sometimes, if neither would give in, they would even use their teeth, but the bites inflicted were not serious, and they soon recovered their tempers. In the end they would eat almost ungrudgingly out of the same dish. They would then take their rest in company, and finally the little monkey would begin to "delouse" the little black dog (a cross between a Spitz and a poodle), sometimes giving us much as an hour to the job. And once, when the dog had picked up some mites

in the garden, she caught the vermin one by one, eating one now and again, or throwing them away.

All these monkeys were sorely afraid of unfamiliar creatures and objects. Any new arrival, any impressive-looking human being, or any conspicuous object might startle them and fill them with dread. The first time I gave them a tomato they squeezed themselves timidly into a corner of the cage. They were even more terrified by the flue-brush. An experiment with two little statuettes had peculiar results. One of these represented a "Bacchus riding on a Tiger" (in bronze, after a well-known statue exhumed in Pompeii) while the other was a cheap mass-produced article which was really a receptacle for toothpicks. I set them in front of the monkeys, one after the other, and both figures alarmed them. Nevertheless, Java, who since December 1930 had taken the lead in everything, came hesitantly from her corner, approached the figure of Bacchus, and stalked it on all sides, and even from above, clambering down the grille of the cage, but repeatedly shrinking back. Thereupon Mako too plucked up a little courage. In the end they cautiously felt the tiger's uplifted paw, and when at last they realized that the thing was harmless they began to play with it, finally throwing it about. The little figure of the boxer made less impression on the monkeys. At first, indeed, it frightened them, but in a few minutes they began to finger it (Plate 21).

The effect of the figures on Hexl, the Meercat, was very different. She rushed at the tiger in fury,

struck it in the face, and continued to do so for perhaps half a minute. On the other hand, the toothpick-holder inspired her with such terror that it was nearly eight minutes before she ventured to go up to it. Both articles left Guapo, the Howler Monkey, completely unmoved. He even walked over them without paying any further attention to them.

If we consider the attitude of the three Meercats to the figures, we see that it is in principle the same. It was striking, however, that Hexl fought the tiger, whose paw was ready to strike, but was apparently terrified by the gaping red mouth of the boxer. Guapo calmly ignored both objects. Why was he not startled by them? Did he regard the creatures represented as innocuous, or was it that the tiger's paw and the boxer's mouth had not impressed him as dangerous weapons? Probably the latter explanation is correct.

The alarm of the Macaques when confronted with a large living grass-snake had peculiar results. On Java's features a paralysing terror was depicted. Both monkeys turned pale even to their gums. This was how the incident passed off: The snake was shut into an ordinary shoe-box and placed in the monkey's cage. Mako and Java immediately came forward, and heard the snake rustling as it thrashed about. Having no notion as to what the box contained, they slowly crept up to it, and lifted the lid. Now the snake protruded its head, whereupon the monkeys instantly took to their heels, Java carrying the lid of the box with her. However, curiosity soon got the better of fear,

and they approached the snake again (Plate 22), but not without taking a protective measure; that is, the two of them held the lid in front of their bodies like a shield, and gazed at the snake with interest, though not without visible uneasiness.

But when I got another person to approach them, holding the snake in his hand, and when they caught sight of the vigorously writhing body, they were once more terrified. Their dread of snakes persisted for a long time, but finally they quite got over it, just as they eventually ceased to fear everything that had once filled them with terror. (They did not show any reaction whatever to a painted snake.) They fled before the marten, but later on they used to pull his fur when he passed by their cage. They were frightened again when he ruffled his tail until it resembled a bottle-brush, but they gradually became accustomed even to this spectacle.

In considering all these cases it must be remembered that these animals had often been startled and terrified in their early youth, from the time of their capture to their arrival in Munich. No animal finds transportation agreeable. Close confinement, with extreme restriction of its accustomed freedom of movement, a completely new and unnatural environment, the confrontation with human beings, of whom its experience is anything but reassuring, the unaccustomed food, and other changes, evoke in the animal a lasting mood of depression.

I was able to enter the monkeys' cage at any time, and sit beside them. As a rule, however, they came to me. Mako took up his position on my head, and Java on my shoulder. Even when they

quarrelled—the cause of the dispute being the greed of Java, who was given to snatching at everything within reach, or Mako's love of teasing—I was often present in their cage. But at such times their behaviour to other persons, whether acquaintances or strangers, was distinctly hostile. Men were robbed of their handkerchiefs or neckties; women lost the ornaments from their hair or their hats, and even the maid, who looked after them, now and again had a handful of hair pulled out. Java, in particular, was extremely revengeful; she never forgot an affront, and would threaten the offender with her fists. Sometimes both monkeys would throw stones, and even worse things, at persons who were disagreeable to them. And when the Grey Heron once gave Mako a dig with his long bill, the offence was not forgotten. Three days later the heron was striding inoffensively past the monkeys. Suddenly they seized one of the perches lying in the cage, and thrust it like a lance through the grille against the startled bird, who saved himself only by lifting his body with a jerk. This procedure was several times repeated. Even the magpies were persecuted in this manner.—Mako and Java were my most troublesome children.

10

"WOLFIE"

★

His sire was a Russian wolf; his dam came from Rumania. Both were taken captive, and Wolfie, their son, was born in the Berlin Zoo. When he came to me he was so small that he could comfortably lie down and stand up in a box 19 by 12 by 11 inches. And since he was accustomed to a milk diet, he had to be given the bottle. Like that of young foxes, his coat was rough and bristly. His canine teeth were already of respectable size; the rest of the teeth, on the other hand, were still merely little swellings on the gums. As a true wolf, he had stiff, erect ears, unlike those of our sheepdogs.

We could not get him to drink much at first. Upset by the long journey, he contented himself with the merest sips. Having taken some 10 ccm. of milk, he fell into a deep sleep, which continued for several hours. When he woke, late in the afternoon, he ate some minced meat, slightly warmed, and his appetite was then astonishing. He accepted the meat eagerly, but he continued for some weeks to drink from the bottle. On his second day with us he began to whine at 1.0 a.m.

He slept in his little box in the corridor, close to my bedroom, but the first time I came too late and had to dry him. He continued to give such warnings as long as he slept indoors, a proof that

Plate 25. "Wolfie" playing in the meadow with a young Lamb.

Plate 26. "Wolfie" brings me the door-mat.

Plate 27. "Wolfie" carefully unties the bow on the plait of the little girl, who is quite a stranger to him.

Plate 28. "Wolfie" has received a visit from a strange dog, and is here investigating his tracks.

it should not be very difficult to keep a young wolf as house-clean as a dog provided one understands his warning and goes to him in time. Probably he had been very uncomfortable on the long journey, when he had to lie on a wet and filthy bed.

His vigorous life-tempo made it impossible for him to stay in his sleeping-box. In the daytime, whenever he woke from the sound sleep which every healthy young animal enjoys, he went into the garden, where he played with the flowers, and also with other things which were placed at his disposal, such as old boots, rugs, belts, braces, and the like, and it gave him especial pleasure to shake and bite and growl at a goatskin belonging to my dog. Then he turned to the dog himself, leapt all round him, wagging his tail, and tried to gallop after him. To us he was greatly attached; he followed at heel, and immediately began to whine if I left him and he could no longer see me. He behaved in the same way to the other members of my family, and to two or three other persons. He nipped our calves now and then, but we did not take it amiss, as this is an old canine custom. In the pasture he made the acquaintance of a lamb, three days old, and since the two animals played together so prettily I bought the lamb as a companion for him. But my dog, or any dog that happened to pass the garden fence, meant more to him than any other living creature, whether lamb or human being (Plate 25).

During the first few days following his arrival, he would painfully make his way up the steps leading to the house—now and again turning an

involuntary somersault—and would then begin to whine at the front door for admission. But once he was indoors a still greater obstacle presented itself; namely, the stairs leading to the first floor, the lower steps of which make a sharp turn to the right, so that on the left-hand side of the staircase the steps are broad and easy to climb. He was able to manage the first few steps, but he had to be carried up the rest of the staircase. Profiting by this experience, he tried ascending the broad side of the steps, and actually succeeded in reaching the last and eighteenth step. Thenceforward he avoided the narrow end of the steps on going up and down stairs. This instance of quick adaptability is typical of Wolfie's behaviour in respect of novel situations, and is also characteristic of his tenacity of will.

Wolfie's development, and the rhythm of his life, might be represented by a steeply rising curve. Having a good appetite—indeed, his voracity was simply grotesque—he made much quicker progress, both bodily and mental, than dogs of the same age.

If now, after many months, I look back upon Wolfie's life, I see in him, at one and the same time, the beast of prey with the special temperament of the wolf, and the primitive dog. The general characteristics of the predatory animal, as we see them in our cats, martens, foxes, bears, and dogs, are betrayed even in his manner of playing. He will snatch at a scrap of cloth, or a piece of carpet, carry it about and shake it, and snatch it up again, or he will bite an old boot or a piece of wood, or play with balls, which are seized, carried about, and dropped, and set rolling again with a touch of

the paws; and one sees the predatory animal in his way of dealing with mice. These he kills instantly with his teeth, throws them into the air, and catches them again in his mouth.

All this, of course, is indicative of the predatory instinct. But what is special in him is the racial psyche of the wolf, which verges very closely on that of his relative the dog. In this respect he seems to me so essentially dog-like that whether in play or in earnest he reminds me now of the naughtiness of this particular breed, and now of the kindliness and loyalty or the watchfulness of the Great Dane, without his harshness of character. He behaves exactly like a dog when he runs about with a stick in his mouth, and presently lays it at my feet.

He does not always bring things to me of his own accord; he often teases me by pretending to bring them. But it certainly should not be difficult to train him to fetch any object; for after all, such things have already been thrown, and are often brought back if thrown again (Plate 26).

His submissiveness is at once definitely wolfish, and dog-like. If I touch him in rebuke, or threaten him with a strap, he immediately throws himself on his back, usually with his legs drawn up, or he will even lie on his side in the endeavour to expose as little of his person as possible. At other times, if I reproach him, he will creep anxiously towards me. This is the more remarkable, inasmuch as he has never been beaten in earnest. Very doglike, too, is his manner of joyfully leaping round persons whom he knows well. At such times he reveals a whole series of characteristics which we con-

stantly note in our dogs. Among these I may mention the habit of eating the dung of animals, and of rolling on old dishcloths, fish-skins, cheese-paper, stale blood, raw meat, etc., although he has never yet tasted the latter, as hitherto he has been given only cooked meat with rice. He is fond of rummaging in manure-heaps. Here he snuffs and scratches and digs as his ancestors were doubtless wont to do when they haunted the sites of the settlements of primitive man, rooting in the midden-heaps and dung-hills as the little wild dogs still do in many parts of the globe.

Beside all these wolfish and dog-like characteristics he has two mutually incompatible and conflicting traits. One is his fear of anything unfamiliar (human being or dog or lifeless object) that suddenly appears in his environment, and the other is the pack instinct. This fear is characteristic of any wild and persecuted animal, whether hare, roebuck, stag, tiger, hyaena, or what not. Elephants are to-day no less afraid of the hunters who pursued them than the wolves which we have fought for thousands of years. I have already described the timidity of my monkeys when confronted with anything unfamiliar.

Wolfie is timid and cautious in respect of all adult human beings. But to children, without exception, he is devoted. In their society the pack-instinct overcomes the purely passive sense of timidity (Plate 27).

All animals that live in large companies are sociable creatures. Of these are cattle, the monkey tribes, and also, among others, the wolves. The

latter are genuine herd animals, though their relation to the pack is not so close as that of the other animals I have named.—The wolf is satisfying the herd instinct when he tries to attach himself to the dog; and even his need of attaching himself to us points to the same instinct. Now and again we seem to note symptoms of the inner conflict, when he runs up with the intention of making friends with a strange person, and then suddenly shrinks back with his hackles bristling. What he perceives, and what fills him with alarm, is not only the visual image of a man but also the olfactory image. Indeed, he need not see a man at all in order to be afraid of him, as the following example shows: One morning, when Wolfie was still lying asleep in his kennel behind the house, the chimney-sweep came, did his job, and went on his way. When Wolfie, brisk as always, jumped out of his kennel and approached the concrete path leading from the garden door to the house, the hair along his back bristled, and he backed a few steps. He was enticed with an offer of meat, but in vain. Wolfie behaved exactly like a dog, or a man, who wants to jump over a deep ditch or a stream, but does not dare to do so, lest he should fail to clear it. He ran to and fro along one side of the path, in a state of mind that wavered between desire and timidity. At last he took a run and cleared the obstacle. Strangely enough, there was not the slightest trace of the sweep's footprints to be seen. It was merely the scent that made Wolfie so uneasy.

The scent of an *unknown* animal also evokes fear. In May 1935 a racoon was sent to me. It arrived

in the evening, and since Wolfie was already in his sleeping-kennel he could not see the newcomer. Next morning, when he left his kennel and was about to hurry to his platter, he threw up his muzzle, ruffled the hair along his spine, stopped for a moment, seized the full platter, and ran off behind the house with it. Here he ate very greedily, and then, growling and emitting monosyllabic yelps, began to move in the direction of the racoon's cage. The new guest was still asleep in his box. Suddenly Wolfie began to feel afraid; he crouched on the ground, and trembled all over. He then cautiously approached the cage, but suddenly took to his heels in panic terror. All that day he was greatly excited.

Things could not go on like that; the two creatures had to make each other's acquaintance. The racoon was accordingly taken out of his sleeping-box, and placed against the grille, up which he promptly climbed. In a moment Wolfie's attitude was changed. He ran up to the newcomer, wagged his tail, and wanted to play with him as he plays with Pedi, the marten. However, the racoon was not inclined to play.

Is it not curious that the scent of the unknown animal should evoke fear, while the visual impression was immediately reassuring?

At a very early age Wolfie gave evidence of remarkable olfactory powers. A little later he began to manifest an unusually keen tracking instinct, and proved to be both a zealous and an extraordinarily able tracker. He began to follow the tracks of men and of dogs much earlier than do puppies of the same age; he would snuff up-

wind, and he soon smelt out the place where the dog slept in the shrubbery. In the street, as in the garden, he followed the trails of human beings and dogs, and even the tracks of motor-cars. Everybody who came to the house was carefully observed from a little distance, and as soon as he had gone Wolfie began to follow his trail.

In following the trail of one of my badgers, Wolfie went to work in a very original way, and quite of his own accord. This badger lived in the garden, where he had a roomy cage, which contained two sleeping-boxes and a water-trough. Apparently the cage was not big enough to content him, for he dug two burrows in the earth, one about 10 feet, and the other a little over 3 feet in length. This latter led into the open. Evening after evening, about 6.0 o'clock (it was then winter), after he had taken his supper in his cage, the badger escaped into the garden, returning to his quarters a few hours later. The first time he had left his dwelling and returned Wolfie happened to go sauntering by the cage. Immediately he picked up the scent, went through the garden, twisting and turning, hit upon two of the privies dug by the badger, came to the boundary of the garden, skirted the house, and returned, with many loops, to the point of departure. Since I had no idea where the badger had gone this following of the trail was of course unintelligible to me. However, the case was suddenly altered when early in January 1935 there was a heavy snowfall, so that one morning I was able to see the whole of Brock's footprints. I estimated that he must have travelled over one

hundred yards, including various loops and curves and spirals. Wolfie worked over the trail for something like ten minutes, and returned to the point of departure, where he began to dig. The trail must have been about ten hours old. I was also able to see how Wolfie followed up the scent left by our gardener after his day's work (he went home about 4.0 or 5.0 p.m.), and picked it up again the next morning before the man had appeared. The scent was then twelve to sixteen hours old. If any member of the household crossed the scent Wolfie was never misled; at such times our tracks had no interest for him.

Once the badger's trail ran between some fir-trees and into my neighbour's garden. One could see, by the tracks in the snow, that he had gone some 5 feet into the garden and had then returned. My attention having been aroused by Wolfie, I now saw how the badger had managed to do this; he must have gnawed through two slats at the bottom of the fence.

The thoroughness and concentration of Wolfie's investigations led me to lay trail with a dog and allow Wolfie to scent it out. On January 18, 1935 (at 11.15 a.m.), the Airedale terrier bitch "Alda," who belonged to my neighbour to the north, Herr von A——, was brought into the garden by Fräulein von Z——. The soil, as well as the surface of the snow, had been frozen for some days, the temperature being 26·6° F. Inside the garden, about 6 feet from the garden door, the bitch left a token. Taking advantage of this fortunate accident, I requested Fräulein von Z—— to walk

along the garden path from east to west, and to stop at B. From this point the dog was to be called away. Fräulein von Z—— was to wait there until my daughter could reach her, and hold Alda. The Fräulein was then to walk as far as the fence (at C), from which point Alda would again be called.

The experiment was made at 11.30 a.m. Wolfie

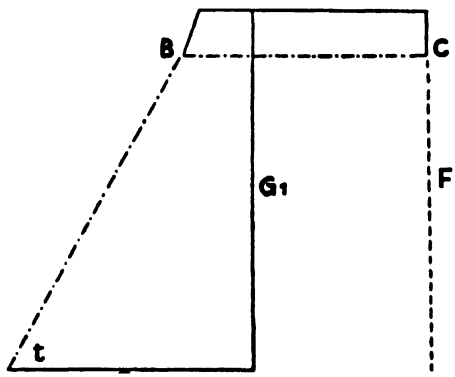

FIG. 1.

A—B—C Track of Airedale bitch Alda.
G Path leading to house.
G_1 Path through garden
F Fence, *t*, token left by Alda.

was in his cage, and could not see what was happening. When Fräulein von Z—— called her the well-trained bitch ran straight for her, and then stood still until a second call from the Fräulein brought her to the garden fence. The bitch was then lifted over the fence, and taken into Herr von Z——'s house by a third person.

Now Wolfie came on the scene. The two ladies entered our house, and watched the subsequent

proceedings from a window. I myself remained standing by Alda's token. Wolfie, on being released from his kennel, sprang towards me, immediately dropped his nose on the moist spot, inhaled the scent, sniffing noisily, and without any hint—and of course, unleashed—he proceeded to follow the trail. At first he thrust his muzzle into each of the footprints (impressed in the snow), none of which penetrated as far as the ground, investigating the first 20 yards or so slot by slot, smelling each print with extraordinary uniformity and persistence. Then, holding his muzzle a little higher, and moving more rapidly, he came to the place where the bitch had first halted and sat down. Sniffing thoroughly all round him, and paying no attention to the lady's footprints, although he actually slid his muzzle across them, he immediately passed on to the second part of the trail, following this with his head half lifted, until he came to the fence, and the end of the track. The first and longer part of the dog's journey revealed various alien footprints, old and recent. The tracks of the badger's nocturnal rambles were visible, and also the footprints, now about three hours old, of members of the household. The second part of the journey led through an almost untouched area. Fräulein von Z——, of course, had walked in the direction of the fence, but she had called the Airedale off her track, so that she ran parallel with it. The two tracks —hers and the Airedale's—lay about 12 feet apart.

Wolfie pottered about the fence for some two minutes, just where the bitch had been lifted over it into Herr von A——'s garden; he then ran up

to me (I had not moved from my position). The whole investigation took about three minutes. Ten minutes later, when I was taking Wolfie for a walk in the garden, he went once more to the spot where the Airedale had first halted, and followed the trail backwards for about two yards, but made no further search.

He was no less interested in the scent of male dogs. He would not only follow up their trail when almost on their heels (Plate 28), but he would work over a considerable portion of the trail when the dog had taken leave of him after a long period of play. In following human trails Wolfie is making remarkable progress. We, of course, and other people whom he knows well, no longer represent an enigma to be investigated, but the trail of every strange or unsympathetic person is picked up and followed with great interest. For example, the trail of the gardener who once threatened Wolfie's property was thoroughly and repeatedly investigated.

In all these directions Wolfie's performances are really remarkable. He is so eager to follow any scent that interests him that he will trace it out without being kept on the leash. I have never known a young hound capable of this, and only a few professional trackers. He is unusually thorough in his work, and critical in his refusal of alien trails. But this strongly positive quality is coupled with a negative trait—namely, his timidity. This is natural and innate, and is doubtless advantageous to the predatory wolf, inasmuch as it makes him careful to avoid danger. He would, however, be useless as a professional tracker. It would be neces-

sary to make sure that he met no one while following the trail, and that he heard no unexpected sound, or he would simply take to his heels.

Wolfie is not content with investigating the footprints of persons unknown to him; but if anyone has been sitting in the garden, on a bench or chair, and has gone away again, he investigates with the greatest thoroughness the place where they have been sitting. That is, he sniffs the whole area to which the scent adheres, including the circumference, in order to ascertain its extent and configuration, dwelling longer with his nose on certain points, and thereby building up what we may call an olfactory image.

Very often, while he is doing this, he puts his nose to the ground again, as though testing the footprints of the person in question, if he has not already examined them—which, as a rule, he does. This comparison of the two scents is repeated several times.

On Easter Monday, 1935, Wolfie surprised me by investigating the place where a person unknown to him had been sitting on a garden bench some twelve or thirteen hours earlier. This gentleman had called on us in the afternoon, and had left the house about seven o'clock, at a time when Wolfie was already in his kennel. Next morning about 7.30, as he was making his regulation tour of the garden, he came to the place where we had been sitting with our guest on the previous day, followed his scent on the ground, and from the ground to the bench, and seemed to be unusually interested in the area to which the scent adhered, but hardly

noticed the places where we had been sitting. (The night of Easter Sunday was warm, and there was no dewfall.)

In addition to his acute sense of smell Wolfie has an extremely sensitive sense of hearing, which detects the faintest sound, and is certainly the sense which gives him the clearest warning of what is happening at a distance. His power of localization is really astonishing. Even at the age of eight weeks he could discriminate between all sorts of sounds, and knew who it was that called him, though the caller was out of sight. If he was somewhere in the garden, and one called him from an upstairs window, invisible to him, he always ran to the person who was calling him, even if the window was at the back of the house.

His sense of smell and hearing are far more acute than his sense of sight. As regards the perception of distant objects Wolfie may be the equal of the dog, but he is definitely below the average dog in the recognition of persons—that is, in the perception of form. If I change my clothes, and wear an unfamiliar overcoat and hat, he does not recognize me until I approach within 10 yards or so—unless he manages to scent me. Of course, he recognizes a man, or sheep, or dog as such at a greater distance. And this, for a predatory animal, would be quite sufficient. To the wolf living in the free state the outward person of a human being, or the expression of his face, would be quite immaterial in the event of a sudden attack.

Vocally, Wolfie is less richly endowed than the dog. To be sure, he can growl, whine, and howl

like a dog, but he cannot bark; that is, he does sometimes try to bark, but he gets no farther than uttering a single monotone, which is seldom repeated on one and the same occasion.

Wolfie is extremely loyal, and greatly attached to us; he is never aggressive, and never makes the least attempt to bite us in earnest. If now and again he is given a light cut with a switch—and one must sometimes rebuke him for a too violent greeting—he never reacts to the blow by growling or snapping, but remains as friendly as ever. Wolfie has all the canine qualities, though in an exaggerated form, and is in the pink of health.

II

THE OLFACTORY WORLD OF THE DOG

★

As we saw in an earlier chapter, the dog's power of vision is inferior to our own. As though to atone for this inferiority, his sense of smell is very much keener. Here we are confronted with faculties which to us are incomprehensible, as we simply do not possess the organ for such olfactory triumphs as the dog's. To put it more plainly, what the signpost is for our human eyes, the scent on the ground is for the dog.

Take the case of the slots of a stag or hind. If it has rained heavily, or if the ground is covered with snow, we can see the prints as plainly as the dog. But in dry weather, or if the ground is only slightly moist, none of our senses will inform us of the existence of such a trail. To the dog, however, the absence of a visual image is a matter of complete indifference. Under such conditions he will follow the trail just as easily as if it were visible. Indeed, a good hound will pick it up even in the snow, trusting, even then, to the nose rather than to the eye.

The invisible trail reveals itself to the dog's olfactory organs by its special scent. For example, the roedeer, as an ungulate, whether buck or doe, has certain scent-organs between the toes of the hind feet. These are the highly developed glands

in which the so-called interstitial sacculae are situated. When the roedeer is running the lateral pressure of the toes on the sacculae results in the expulsion of the minutest quantity of the special secretion which scents the cloven hooves, and through them, the ground. Dogs and other carnivorous animals—and even hares—secrete perspiration from the balls of their feet, which is transferred to the ground.

But how does the dog discover the trail of a man? Twenty years ago it was still erroneously believed that the dog went entirely by the individual odour of the man, following the odoriferous particles which were thrown off by the feet, whether shod or bare, and left behind along the trail (abraded cells of the epidermis, secretions of the sweat glands and the sebaceous glands). To-day we know that the trail left by a human being is characterized by a mixed odour. For example, if we walk through meadow or field or wood with booted feet, we bruise the ground by the weight of our body and leave behind us a general human odour as well as our own individual scent and that of our boots (tiny particles of sole-leather and blacking, polishing cream, etc.). To all this is added the smell of the trodden soil, and of certain fungi, the odour of crushed herbage, the scent of liberated sap, and so forth.

The scientific literature on the olfactory performances of the dog, based upon practical experience, goes back to the years 1913–14, and acknowledges Konrad Most as its intellectual parent. As a result of its findings our conception

of the dog's performance, and therewith our method of training, has been essentially modified. We know to-day that the dog's nose, while following a scent, is operating in an invisible cloud of odours, a "trail-complex." And among these odours, including the general human scent, the well-trained dog will gradually learn to distinguish the characteristic individual odour of a particular person. But the learning of this lesson entails a great deal of hard work on the part of both dog and trainer.

Dr. Menzel and his wife have done pioneer work in training dogs to recognize identity of odour. By "scent" they understand a definite, individual odour, which the dog has to follow and remember under any circumstances. To this end he must learn to recognize not only the personal odour of his master, but also that of any other person. In order to facilitate this transference of interest the dog is made to inhale the scent of some person familiar to him. This person lays a trail, at the end of which he throws down some article which already carries his personal odour. The dog has no difficulty in identifying the trail with the object. When he has learned to recognize the individual odour of his master, and also that of some person known to him, he proceeds to identify the trail and the object. To this end the dog is made to "take the scent" of the person in question—from his armpit, or his feet, or his head alternately, while the word "Scent" is constantly repeated "in a reassuring tone," until he has learned to identify, for example, an article of clothing with the wearer. This lesson is taught as follows: Several

persons divest themselves each of a tie, a waistcoat, a stocking, etc. These articles are laid on the ground, at definite intervals, where they are not visible to the dog. It is now the dog's task to pick out the right article. To do this he must first "take the scent" of the person in question, then run to the discarded articles of clothing, and pick out the right one. It is astonishing to see with what certainty and accuracy Dr. Menzel's dogs (Boxers) perform the appointed task of identifying the individual odour of the person in question with the discarded article of clothing. Both Most and Menzel have shown that the dog is able to distinguish the individual human odour from a complex of scents (Plates 29–30).

As these experiments dealt with the identification of the human odour with that of an article of clothing worn by the person who laid the trail, I now decided to investigate another problem: namely, how would a dog behave in the case of a trail laid by other dogs? This meant, in practice, that dogs were to lay trails, while other dogs followed up the scent. From the positive results obtained we must draw the conclusion that dogs recognize one another by the personal odour, and that every dog, no less than every human being, has an individual odour. Such experiments, of course, confront the experienced tracker—and no other dogs should be employed—with a new situation. The form of the trace, like the olfactory image, is new to the dog, and calls for a new mental configuration. A man, walking on the soles of his feet, treads with a greater weight on a large area

Plate 29. The Boxer takes the scent of the stranger's armpit.

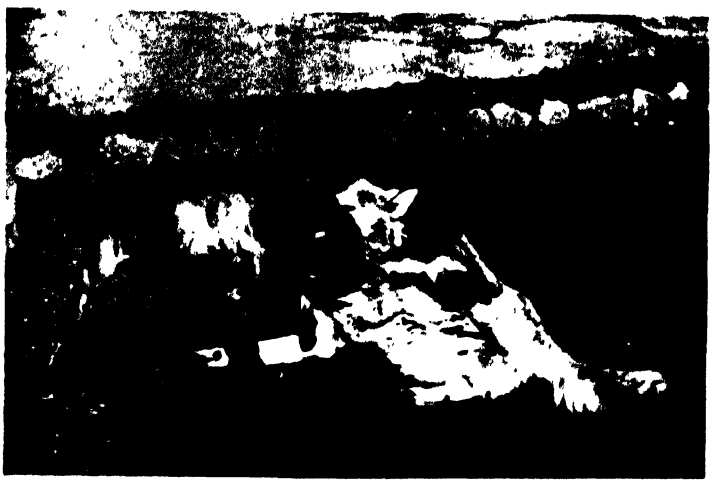

Plate 30. Another Boxer is interested in the scent of "Wollie's" "armpit."

Plate 31*a*. Head of Pedi the Marten.

Plate 31. The number, colour, size, and order of the flowerpots mean nothing to Pedi; he overturns only the pot under which he scents the meat.

Plate 32. "Wolfie" too, as an animal depending on his sense of smell, goes only by the scent, no matter how many flowerpots there are, or how one arranges them.

than the dog, which distributes its weight over the balls of its feet and toes.

In order to reduce the complexity of the trail, and of the general olfactory impression, I postponed my first experiments to the depth of winter, when we had temperatures of 0° F. and lower; the ground was then frozen solid, as was the deep snow that covered it. Under such conditions the odours of the soil, and of any abrasions of its surface, were eliminated. Further, the new trails did not smell of bootleather, etc. The mixture of scents was now greatly reduced; all that was left was the general "doggy" odour and the personal scent of the dog who had laid the trail. The dog had now to distinguish between these two scents.—It must be mentioned, however, that we seldom found the fields entirely free from trails; the tracks of both men and animals were usually visible—among them the tracks of foxes, roedeer, hares, and birds of different species—which made the dog's task more difficult. As regards the form of the trail and the misleading cross-trails, I kept for the most part to patterns which were already familiar to the dogs; on the other hand, they were also tested with completely new patterns. Very often, too, the dog was blindfold, so that it should not be said that he saw the footprints in the snow and merely followed them. It was found that under such conditions the dogs worked even more carefully than usual, though more slowly. (I used the bandage also in tests over trails laid by human beings.)

The dogs that laid the trail and followed the

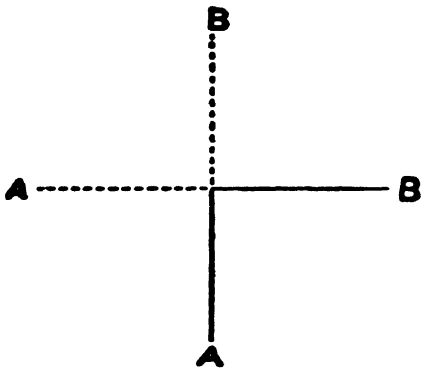

FIG 2.—HUMAN TRAIL. MOST'S CROSS-TRAIL

The trail (—) and the cross-trail (. . . .) were laid at the same time. The two trails touch at an angle of 90°.

A = beginning of trail; B = end of trail. The dog rejects the strange trail (cross-trail), and follows to the end the trail on which he has been set.

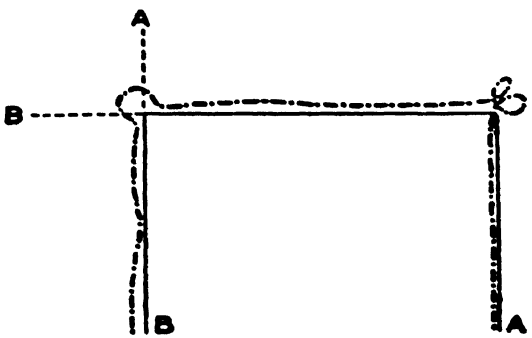

FIG. 3.—CANINE TRAIL

One dog lays the trail, and another the cross-trail; a third follows up the scent and rejects the strange trail. Track of the third dog (— - — - — -).

scent were of different sexes. A male dog was set to follow the trails of dogs and also of bitches, while a bitch was set to follow trails laid by bitches and by dogs. The results of the tests showed that the dogs were not led astray by the sex of the animal that laid the scent. The final result of the

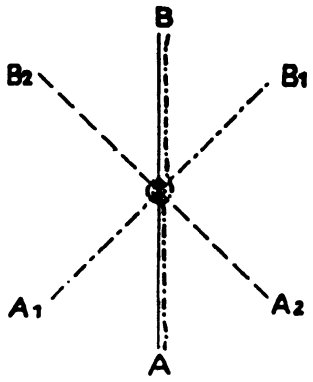

FIG. 4.—One dog lays a trail; two dogs cross it; a fourth dog follows up the scent and refuses the strange trails.

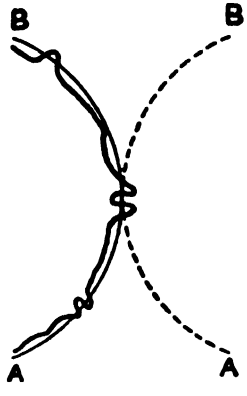

FIG. 5.—One horse lays a trail (unbroken line), and another lays the cross-trail (dotted line). The dog follows up the first curve.

tests was to prove that dogs are able to recognize the *individual* scent of other dogs in following their trails.

Still in the winter months, I made some tests in which two horses had to lay trails for the dogs. In view of the great bodily weight of horse and rider, it was desirable that the ground should be frozen so hard as to be invulnerable to the horses' hooves. As a matter of fact, not the slightest particle

of loosened earth was visible in the snow. The performances of the dogs exceeded all expectation. They followed the most difficult patterns of trail with the greatest of ease. This is the more remarkable, inasmuch as the horses, whether of the same sex or otherwise, occupied the same stable, and their hooves were greased at the same time (eight o'clock in the morning) with the same grease (cf. Figs. 2–5).

In considering the olfactory performances of the dog we should bear it in mind that for us his world of odours must always remain an enigma, since owing to our weak sense of smell we have no real basis of comparison. And since the human world of concepts is based almost entirely upon visual impressions, we are prone to refer our memory-images to visual perceptions. The relation of the dog, as a *Nasentier*, or "nose-animal," to the outer world is very different. We must resign ourselves to *estimating* his olfactory perceptions and the mnemonic processes based upon them. For these are just as real as his visual perceptions and memory-pictures, though different in quality.

In the highly qualified tracker the whole complex of his olfactory achievements is related to the faculties of intense attention and concentration upon his work. Tracking, for the good hound, does not consist in mechanically trotting along the trail to which his attention has been directed until he has come to the end of it, or has even overshot it. Of course, this does sometimes happen even with the best of hounds, but it is the exception, and by no means the rule.

In respect of this faculty, so closely connected with animal intelligence, the dog, even though his intelligence is one-sided, stands far above the average monkey, who is incapable of such lasting attention and concentration upon one object. For the average monkey's interest in *all* the things that go to make up his environment is so great that it does not allow him to follow particular happenings, or give lasting attention to any problem with which he is confronted. Hence the scatter-brained and restless nature of these animals. We may sum up the differences by saying: In the dog the visual sense is more restricted than in the *Augentier*, or "eye-animal," but as though in compensation the gate of the olfactory sense is more widely opened. Ultimately appearances from his environment pour in upon him through the senses of smell, sight, and hearing, with which he deals in his own fashion and according to his intelligence.

In order to afford the olfactory sense yet other opportunities of showing what it could do, I made the following experiments: I arranged a number of flower-pots, of uniform size and colour, upside down, in definite groups, and got a second person to place a piece of cold meat under one of the pots. In order to avoid touching the pot with my hand, I lifted it by means of a short stick.

The flower-pots were arranged in a number of different ways—in circles, triangles, squares, and polygons—or they were left in disorder. Sometimes, for a change, the pots were arranged in groups, or a single pot was left outside the assemblage, in such a position that it should have attracted the attention

of an investigating animal. However, it proved that such arrangements, which would doubtless have been obvious to an "eye-animal," had no influence on the choice of "nose-animals," which were guided only by their sense of smell. Even the colour and size of the pots, which were varied in later experiments, could not divert them from their goal.

These experiments, which were spread over several years, were carried out with the assistance of a vixen, the marten, Pedi, and in 1935 Wolfie, then two months old. Further, two sporting dogs were tested: namely, a pointer and a spaniel, each in the presence of his master. The animals were always tested singly; first each was shown what was being done—that is, a scrap of meat was placed under one of the pots before his eyes, and he was allowed forthwith to go to the pot in question and obtain his reward. But after this none of the animals was allowed to see anything of our preparations. None was more successful than the five-year-old vixen; she scented the meat at a distance of 80 inches, went without hesitation to the correct flower-pot, and overturned it with a graceful movement of her right fore-paw. Next to her came Pedi, the four-year-old marten, who scented the meat at a distance of 40 to 60 inches; and then Wolfie, at the age of three months; but later, when his sense of smell was fully developed, he overtook the marten. The two sporting dogs did not do so well. It seemed to me that they did not quite understand what was wanted of them, for they were greatly excited by the scent of the

various animals. The fox, wolf, and marten failed in only an insignificant percentage of trials; and to-day the wolf almost equals the performance of the vixen (Plates 31, 32).

The dogs, and the wolf, are allowed to approach the flower-pots from any distance they please, whereas the vixen and the marten have to be tested in their cages, where they are limited as to space: for the vixen, once outside her cage, would probably disappear for ever; and for experimental purposes Pedi is available only in his cage, as once outside it he either tries to climb the trees, or loses himself in the garden, or even goes out into the road; except when in his cage he is incapable of the concentration required for the carrying out of a test.

12

TAME AND TIMID ANIMALS

★

ONE bright summer day I was lying on the grass in my garden. A young heron was rummaging in my hair with his bill; another was nibbling at my buttons. Just then a neighbour called over the garden fence: "Do tell me, are those birds *tame*?" A satirical person might have been tempted to answer: "As you see, they are perfectly wild!" But there is some excuse for asking such a question, for people have the vaguest notion as to what is meant by "tameness." Even if you ask a keeper or a trainer of animals what he understands by the word you will rarely get a satisfactory answer. This vagueness is due to the relative nature of the quality—to the existence of many degrees of tameness. Here are a few examples which will throw some light upon the matter:

Day after day, in Munich, we see townsfolk or foreigners feeding the pigeons. Some strew the food on the ground; others hold it out to the birds, and are delighted if a pigeon settles on the outstretched hand and pecks at the offered grain. The tameness of the pigeons is reasonably enough a matter for general astonishment. But now and again we hear someone say: "Well, what impudence!"—because a sparrow has taken the liberty of doing what the pigeon is praised and admired

for doing: and the onlookers do not realize that they are applying two different standards. Now and again one of those who are feeding the birds will stretch out his hand in the attempt to take hold of a pigeon. But the pigeon will not even allow itself to be stroked, much less caught. And in this respect our domestic pigeons are by no means peculiar; this higher degree of tameness is very much rarer. Almost all animals struggle at first against the hand that may seize them and take possession of them. Its approach arouses the instinct of self-preservation, and the quicker our attempt at capture, the swifter the reaction of flight.

Most people are aware of the probable failure of such attempts, even in the case of strange cats or dogs; hence the cautious question as to whether the animal is likely to bite or scratch.

The dealer or keeper speaks of "finger-tameness" when he has taught a bird or animal to allow itself to be stroked. This stage of tameness is comparatively soon attained, above all with young creatures. But is this degree of tameness the highest? By no means. Even when an animal comes to us of its own accord in order to be caressed it has not reached the final degree of tameness. This highest degree we find in the devotion of the dog, which may be described as the classic example of tameness. Not only does he follow us wherever we go; he becomes also our helper, protector, and defender. But, after all, we must not forget that he is the oldest of our domestic animals, and that many thousands of years of breeding and training have endowed him with the corresponding hereditary qualities. We do not find

such a degree of tameness in the cat. But the cat, as a domestic animal, is of much more recent date; its history is comparatively short, while the dog, as the servant of man, goes far back into prehistoric ages.—However, quite apart from the fact that the cat is still far more of a predatory animal than the dog, there are biological reasons which explain why it has not acquired the same qualities as the dog. I know, of course, from my experience of my own cats, and also those of other people, that some of them will accompany us for a few hundred yards; but none will follow at our heels for miles as will a dog.—Here we must except trained animals, obedient to the human will; for genuine tameness must come from within, and must be based upon absolute friendship between man and animal (Plate 33).

One of our *jackdaws* used always to accompany us when we left the garden, flying after us for some distance, and alighting from time to time on a garden fence or a tree. This was a high degree of tameness. Perhaps the most unusual case of tameness in all my experience of animals was that of my fox, Caro. Caro used to *sing!* This is how it happened: About midday my fox, without much regard for my convenience, used to jump on to my chest and take a nap; and before falling asleep he would draw a deep breath, just as dogs, and cats, and also little children are wont to do. This inspiration was followed, as it is in the dog, by a growling sigh. Once, when I imitated this sound, he gazed at me in astonishment. This induced me to repeat the sound, at the same pitch, whereupon Caro

Plate 33. Guapo is alarmed, but soon feels safe in my arms, and clings to my thumbs just as little children do.

NAWAB SALAR JUNG BAHADUR

Plate 34. In this position Caro, the Fox, began to sing.

Plate 35. A friendly Starling seeks his nourishment on the backs of the grazing sheep.

answered in the same manner. This was repeated several times; now I began, and now he. And this chance happening inspired me with the notion of trying a different note. To my no small astonishment the fox entered into the game, and in less than an hour he could mimic me over a whole octave. At first he did not hit the individual notes quite accurately; now he hummed a semitone or even a whole tone sharp or flat, and he then practised for a while by himself until he was in tune!

On the following day I continued the lesson. From the very first everything went surprisingly well; but now Caro showed an inclination to go up to the fourth above the octave; he also endeavoured to sound the octave when I hummed the keynote, and conversely, when I hummed the octave he replied with the keynote. Once I hummed for him—and I must emphasize the fact that I hummed, for it was only by humming that he was able to produce his notes—a whole octave in *staccato*, and he immediately grasped the idea. Altogether he had a compass of nearly two octaves; he imitated my tones, practised them for himself in a playful way, and reproduced them with great accuracy. His humming, however, was not uniform in quality; there were days, and occasions, when he was off colour; and in the presence of strangers he gave a poor performance; for he could not quite divest himself of the fox's most prominent quality—suspicion (Plate 34).

I was very glad when Professor G—— (of the University of Munich) was able to come out to see

us, and convince himself of this remarkable fact. It was really remarkable, for with the sole exception of Caro, none of my twelve foxes showed any talent in this direction; and it would be difficult to explain Caro's indisputable musical gift on purely biological grounds.

Here is another remarkable fact. When Caro—who was then alone—was given a mate, he ceased to sing, but when one day she escaped from the cage he began to hum again. He was given a second mate. Again the vixen ran away from him; he himself had the opportunity of escaping, but he did not take it; he remained in his cage. And now he began once more to practise his octaves with me, with and without *staccato* attack.

It is a well-known fact that old animals are much more difficult to tame than young; and it is best to begin the taming of young animals in their infancy; of birds, if possible, as soon as they leave the egg, and of mammals directly they are weaned. If one wishes to be on the safe side, one can hatch the eggs of birds in an incubator, and in the case of mammals one can rear the young with the bottle. Predatory animals can be taken from the mother on the seventh or eighth day—that is, before their eyes are open. Under such circumstances one can be pretty sure, even in this last case, that no trauma is transferred from the mother to the child.—Curiously enough, timid animals have a bad effect on tame ones. The latter soon become timid; whereas the contrary effect is extremely rare. Fear, as both men and animals have often shown, is contagious.

And now the question arises whether *all* animals are susceptible of being tamed. In school we learned —and until recently it was generally taught, and one could read it in books—that a number of animals are untameable. Of these were the African elephant, the Polar bear, the black panther, and a few others. To-day such lists have no validity. Of course, the time required for taming an animal varies greatly, according to the species, for purely biological and psychological reasons. Sorely persecuted animals, such as hares, are extraordinarily timid even when only two to four weeks old; foxes are suspicious, and wolves nervous. Probably animals of every species could be tamed, including such admittedly timid creatures as hares, marmots, cuckoos, etc. As the result of repeated experiences with the young of many birds and animals, I have come to the conclusion that we must not regard timidity as innate. I have many times reared young leverets from the eighth or ninth day, feeding them with the bottle, and lest they should feel cold, wrapping them in warmed woollen cloths. Sometimes by the second day, and at all events by the third, they would stand erect, follow me, close at my heels, about the room, creep into my sleeve in search of warmth, and very soon give proof, by their whole behaviour, of a high degree of tameness. One of my young foxes was so tame that he would run his muzzle through my wife's hair and take out her hairpins, one by one. This gave him the greatest pleasure, and he would play this trick on her whenever she lay on the sofa. My young cuckoos, which were anything from eight to fourteen days

old when I received them, used to breakfast with me: that is, they drank from the vessel held out to them, and took minced meat from my hand; after which they flew through the window to the top of a birch-tree, or into the boughs of a beech, spent some time in a fruit-tree, and a few minutes later—or it might even be hours—returned indoors, and always passed the night in my room. Here they went of their own accord into their cage, which was permanently open. One would assume, theoretically, that these birds would spend more and more of their time out of doors, and that the outer world would attract them more than the house. Each of these cuckoos—I had one each year, for three years in succession—flew off towards the South in August; one, before he followed his migratory instinct, sitting on the twig of an apple-tree close before me.

Everybody knows how little the birds—or even the squirrels—in our parks fear human beings. Here we are dealing with creatures which, born and living in freedom, have become accustomed to us as the source of food, while to the birds and animals that we rear we fill the place of father and mother. For example, when I fulfilled the duties of a parent to my young herons, providing them with food and warmth (the incubator) and protecting them in danger, I was, of course, everything to them.

Out in the woods all the animal inmates flee us—the squirrels, and the very birds that haunt our parks, including the finches and blackbirds. Some of them have already had unpleasant experience of human beings; some, not as yet

initiated, realize from the behaviour of the rest that in case of emergency they must flee. For the instinct of flight, like other instincts, is contagious.

The fearlessness of the birds in our parks is due to other causes than the naïve unconcern of the wild creatures which are without suspicion merely because they have no experience of men. For example, we read in Darwin: "On the Galapagos Islands I struck a falcon from a bough with my rifle, and held a bucket of water out to other birds, which sat on the rim and drank." Farther on we read: "The fear of human beings is only gradually acquired by birds." In another chapter we read that the fear of human beings is much greater in densely populated countries like England than in sparsely populated lands like Norway. In this connection he refers to our magpies.—Experiences such as Darwin recorded have been confirmed by explorers up to the present day. For that matter, if in the forest settlements of savage tribes the lesser predatory animals, such as the foxes, and in some places even the wolves, approach the natives' huts unhindered in order to seek refuse, this state of affairs argues that these savages are very ready to live at peace with the animals. But where the white man penetrates as a conqueror, bringing civilization with him, this attitude is altered for the worse.

If fear is the antithesis of tameness, then fearlessness in respect of human beings may be a natural state, or it may be acquired in the process of taming. But the tameness that results from training differs from the tameness that is due merely to friendly

treatment. In the first there is always a trace of servility and artificiality. Tameness is genuine only when man and animal meet as companions, and where there is mutual affection.

To my thinking, the only way of determining whether fear in animals is innate or acquired is to ask the question of the young bird or animal, and this I have been doing for fully twenty-five years. Each little creature has been required to furnish me with its data toward the solution of the problem.

To this end dozens of chickens were hatched in incubators, and dozens of other chickens, reared by brood-hens, were observed separately from those which had been artificially incubated, compared with them, and subjected to various experiments. Single eggs, too, were hatched, either under a hen or in an incubator. Each of these single chicks had to grow up in solitude. And besides all these there were the young of wild and domestic ducks, turkeys, herons, and ibises, and the nestlings of hawks and falcons.

In the same way I reared young mammals—single specimens (of fox or cat), and also groups of 3 to 5.[1] I have recorded some of the results of such experiments in the chapters entitled "How Chickens come into the World," "My Herons," and "Troublesome Monkey-Children." My experience of monkeys showed me that primitive fear, unless it is due to serious traumata, may gradually diminish and finally quite disappear. Or to speak

[1] Cf. my book *Aus der Welt des Tieres*, Berlin and Frankfurt a. M., 1930.

more exactly: as the result of experience and intuition an inanimate object or a living creature which inspires fear may be recognized as harmless, and may then even become a plaything or playmate. In all such cases it is assumed that the animal has at some time or other been thoroughly frightened (as were the Macaques). That fear may be felt only of a particular object, a particular animal, and that the conception of this object or animal must be innate, is a very inconclusive statement. I found that my Macaques were afraid of *all* unfamiliar things and animals, and also, therefore, of snakes. But the dread of snakes is *not* a special, innate fear in the Macaques, for if it were so they would not be able to lose it as Mako and Java did.

Fear, and especially shock, have protracted after-effects. In the case of fear due to shock it will often take a considerable time to tame the animal. I had a notable example of this in one of my foxes, who took two years to recover from the after-effects of a shock.

Of course, there are animals in whom fear is innate—as I suspect it to be in the wolves—and on the other hand, there are animals which when young are devoted to the human being who rears them, only to turn from him in maturity. This desertion may be lasting, or only temporary.

Terror is felt by the animal in all its limbs. In various animals, from the horse down to the frog, I have observed, in cases of sudden alarm, the immediate emission of urine or faeces. Many animals completely lose their heads in the case of

sudden terror; one might say that they become temporarily insane. Horses, for example, will stand motionless for some seconds, with straddled legs; or will seek safety, like a herd animal (red deer, roedeer, etc.) in senseless, panic flight. In the ungulates such panic often leads to fractured skulls, or broken legs, or even death from syncope.

A grass-snake which had been caught by my stork was at first completely paralysed; then, as I took it from the bird and placed it in a vivarium, it repeatedly dashed its head against the glass, or darted it into vacancy, in a series of completely uncontrolled movements. One of my foxes, when a salute was fired, fell down as though struck by lightning, trembling in every limb, and it was some little time before he could get on his legs again. I noted that two sheepdogs (a Rottweiler and a Dobermann) flung themselves on the ground and trembled all over at the approach of a railway-train, and also when a horse made an unexpected appearance. From this we see how an animal is affected by terror, both immediately and subsequently, and what after-results may remain. This amounts to saying that fear may arise from the sudden alarm caused by anything large and unfamiliar. Fear is evoked not only by the senses of sight and hearing; it can also be aroused by the sense of smell, the sense of touch, and even the general muscular sensation. The horse's dread of blood, especially of horse's blood, is well known. For my wolf the alien scent of the chimney-sweep, or that of an invisible racoon, was enough to reduce him to a state of terror.

Anxiety (dread) is closely related to fear. Once, when I set a fox-cub on the table, he must have been too near the edge, so that his hind legs slipped; but he contrived to hold on to the edge of the table with his forefeet, and began to whimper pitifully. This was genuine anxiety. In a similar situation Wolfie too began to whimper; and both animals groped in the air with their hind feet, but found no purchase. In animals, of course, fear and anxiety cannot be so sharply distinguished as in human beings, but in this case the difference is fairly obvious. (We are *afraid* if we are alone in a house at night and hear footsteps in one of the rooms, and feel *anxiety* if on a stormy night some member of our household fails to arrive at the expected hour.)

Young animals which have been brought up without knowing fear are often quite unsuspicious when confronted with an unknown danger, as many of those which I have reared have demonstrated. A Night Heron flew at the wolf; a Silky Heron attacked my dog, the badger, and the foxes; I have seen hens pecking at a fox, and so forth. Such things would be impossible in a state of nature, as the young birds would have been warned in good time by their parents, and would have learned to fear danger.

The animal friendships, with which we are all familiar, between creatures of similar or dissimilar species, are based on a sort of tameness—in this case a mutual confidence (Plate 35). In the social animals—that is, such animals as live in packs, herds, flocks, and family groups—sociability is a necessary psychic precondition of lasting com-

panionship. Inside such communities friendship and affection between individuals may gradually arise. As Fritz Bronsart von Schellendorf once wrote to me, he had observed such relations on a game reservation. He told me, also, that the story *Eines Nashorns Freud und Leid*[1] ("Joys and Sorrows of a Rhinoceros") was not wholly an invention, but was fundamentally true to life.

[1] *Afrikanisches Tierwelt*, I, Leipzig, 1914.

13

SOME QUEER HABITS

★

THE affection of animals, and especially of young animals, is to some extent a matter of habit. Here the innate and the acquired are mingled and organized. A suitable attitude on the part of the human foster-parent frees the young animal from its inner dependence on its lost parents, and their place is filled by the person who has taken charge of it. From him the little creature obtains all that it requires: food, shelter, protection from aggressors in case of need, and the affection of a foster-parent, which must not be under-estimated. In the case of young creatures which were intended for a life of liberty I have not infrequently experienced that ideal relation which exists, or at all events can exist, between a dog and his master. Such was the relation which developed between my young stork, "Fuzz," and myself. He could not walk when I first received him, but sat all day long in his basket, rocking himself backwards and forwards on his heels, which looked like a couple of tumours, for at this age all storks have immoderately fat heels. But a fortnight later, when he was able to walk, he began to live a rhythmically ordered life, one day being like the next. In this respect he was not an exception among my animals. Every animal makes for itself a sort of daily regimen, and

also allots itself certain spatial boundaries, which for weeks and months at a time are not overstepped.

Fuzz, as he was called, got up at seven o'clock on July mornings, and continued to rise at that hour until the autumn. Just touching the ground with the tips of his toes, he danced through the garden and back to his house, emitted the penetrating cry which meant that he was ready for food, tidied his plumage, and ate his breakfast. After this he took his bath. Two hours later the inevitable "begging call" was heard again: he was frightfully hungry! After feeding he drew in his neck and rested awhile. This period of rest was always spent in a little round flower-bed whose circumference was about that of a stork's nest. Did not this point to a definite recollection of his earliest youth? (Plate 36).

Directly I showed myself he began to beg again. The cries of which I have spoken might continue for a full hour, and were often quite distressing; indeed, they were continued even when he was playing with the buttons of my jacket.

After the midday rest Fuzz again sought the circular bed. The remaining hours of the day were spent in eating, walking, and resting. Punctually at five o'clock he strode hastily to his house. Even an offer of food would not detain him then. Fuzz always accompanied me in the garden, and even through the garden door into the meadow, where he applied himself to catching grasshoppers. If the front door was open he would always come in, march along the corridor, climb the stairs, and rap on the door with his long bill, demanding admittance. Once in the room nothing seemed to alarm

Plate 36. Reminiscences of the nest? Fuzz takes his midday nap in this little enclosure.

Plate 37. Java "dethrones" Mako, never lifting her eyes from his coat. Mako himself is disturbed by my approach.

Plate 38. "Wolfie" rests one paw on a rag, and with the other paw he clasps a bone. Both bone and rag were his property.

Plate 39. The cat is holding on to a cotton-reel as her property and her attention is already wandering to a second reel.

him, even if he found me surrounded by strangers. And here, just as in the garden, he uttered his begging call, with its regular, wearisome rhythm.

Later he became dangerous to small children, so that he had to be shut up if any such visitors were expected. Fuzz always went his own way, and the more exclusive he became in respect of other birds and animals, the greater became his affection for the human beings whom he knew—but he grew no fonder of strangers.

Of my twelve foxes, each had the habit, once it had eaten its fill, of covering the food remaining in its bowl with hay or straw, or even turning the bowl upside down, so that the remnants should not be visible. They did the same with the milk of which they were so fond if any surplus was left. This was certainly not intelligent of them, since the milk was spilt and lost, whereas they could always return to the solid food which they had hidden, and finish it later, as indeed they did. We know that in the wild state foxes bury the remnants of food which they eat in the open. In so doing they are only following an ancient custom of the beasts of prey. My captive foxes bury not only remnants of meat and cake, but also bones; the former, as a rule, with the bridge of the nose, and the latter, in difficult cases, with some assistance from the forepaws; just as my wolf does, and many dogs.

Actually, of course, the concealment of food is merely a matter of making it invisible by scraping and covering. This is shown by a very interesting case, which I have never seen exactly repeated.

Once, when I was sitting at the table with a guest, I gave my dog, who was present, a small bone. He took it, hid it under the edge of a window-curtain which reached the floor, and tried to cover it with rooting movements of his muzzle. He very often buried bones in the garden, and sometimes fragments of cake and so forth, but at no great depth, and without employing his feet—that is, he buried them with his nose. Did it not argue great simplicity that he should make the same movements on the parquet floor, in a wide circumference, all round the bone, until he was quite worn out?

In this case my fox Caro behaved quite differently. He too often hid remnants of food after a meal. Once, when he was lying in the bay window, about a yard from where I was sitting at my typewriter, I threw him a bit of cake, of which he was very fond. However, he was full fed, so he did not eat it, but set about trying to bury it. But the first sweeping movements convinced him of the impossibility or futility of the attempt. What did he do then? He took a sheet of paper from my table and covered the cake with that. Subsequently I often saw him use paper for such a purpose. In the woods, very probably, the foxes do not always scrape a hole in which to bury the remnants of their food, but simply cover them with moss or brushwood.

The habit of covering the food left in the platter is by no means confined to the fox. Our dogs occasionally do the same thing, pushing straw, grass, or hay and earth into their food-platter. My badgers, squirrels, and monkeys do the same; so do the hawks and falcons; and at first my wolf

did it, but afterwards he employed other methods. Bowls of milk are upset after the drinker is satisfied.—We most of us know that dogs have a habit of circling round and round before they lie down on their rug or in their basket. This habit is referred back to the trampling of grass or bedding material by the wild ancestors of our domestic dogs. Although it is now purposeless, many dogs have retained this habit.—It should be remarked that my wolf has never trodden down his bed in this way, although I have given him plenty of reason to do so. I have given him fresh, hard straw, or soft straw, fresh hay, old hay, and a harsh and unevenly-laid sleeping-rug, but in every case I have waited in vain to see him trample it down.

Years ago a hen of mine hatched out eight Indian runner ducks. As every poultry-keeper knows, these ducks have less need of bathing facilities than any other breed. But when one day I sprinkled them lightly with the watering-can they all (though quite mechanically) went through the proper movements of *swimming and diving*. For reasons of cleanliness I continued to sprinkle them for some weeks, and once, when I picked up the *empty can* and made the familiar sprinkling movements in their direction, they all behaved as though they were really wet, except that they did not continue the movements quite so long. I am of course aware that old reflexes were evoked by the sprinkling, and that the moisture acted as a stimulus. On the other hand, when the reaction followed the movements of the empty can there was no stimulation of the skin. The fact that none the less the

reaction followed is evidence of an habitual action.

Animals have a sense of possession, and will defend their property at the cost of their lives. Among such possessions are the dwelling-place, the nest, the prey just captured, or, in the case of captive or domestic animals, an object or a person. Based, for the most part, on the instinct of self-preservation or the instinct of capture, peculiar *habits* have gradually formed themselves, whether they are manifested naïvely, in a playful fashion, or whether in captivity the claims to personal possession are emphasized.

For the crows and ravens, whether caged or in a state of freedom, everything that shines and glitters is property. By my magpies, for example, with their strongly emphasized acquisitive instinct, a bright pfennig was seized and hidden as eagerly as the last shred of a gold or silver thread on a ransacked Christmas-tree.

My wolf, my marten, my fox, and other of my animals carry their food-bowl about with them after their dinner, as being their own property, of which no one must deprive them. In my young wolf more especially I can see the growth of various claims to ownership. Having at last reached the estate of domestic animal, he tries to encircle any strangers who enter the garden, and expresses the fact, by gentle pushing and growling, that their presence is not desired. But there is more behind this. The stranger who enters the door is invading the wolf's estate, and when he approaches me he is encroaching on another's property. Just as a pair of starlings who are nesting in a tree will drive

another starling away, so the wolf shows the intruder that he has no business in our garden. And I? Well, I am among the wolf's possessions! (Plates 38–39).

A very peculiar habit, which on the human observer has a positively visible effect, is the *lousing* of monkeys. This must not be compared with the unequivocal flea-hunting of the dog. For here the action is a necessity, and where the flea does not bite, the dog, as a rule, does not scratch. But in the case of the monkey we are never quite sure *why* he louses. We see, indeed, that this activity is pursued with great thoroughness and tense attention, and, humanly speaking, with a certain devotion to the cause, as regards the mutual search for vermin and other matters. In general the monkey's actions are desultory, and his mind is easily diverted, but nothing could exceed the earnestness with which he concentrates on lousing (Plate 37).

Why does the monkey louse? Is it in order to catch vermin? Or does he perhaps louse for the sake of lousing? Can it be that he is not really looking for vermin, but for something else? Let us take a few examples: My Macaques louse each other mutually, as so many species of monkey are wont to do. If either of them has concealed in his or her fur a foreign body, in the shape of a tiny fragment of hay or straw, or a little thorn, this is immediately removed. But if there is an insect or a mite on the skin, this is at once conveyed to the mouth, as are the little scales shed by the epidermis, and so the "lousing" continues.

I give my meercat "Hexl" a little doll which is

wearing a fur tippet. At first she takes no interest in it, but the fur collar is thoroughly loused. Another case is that already mentioned on page 106. Here a puppy was loused by a monkey, who rid him of the mites he had picked up in the garden, all of which she ate.

Incidentally, I may remark that monkeys are not free from vermin, and, as the specialists have shown us, there are even different species of monkey-lice.

The modern theory is that the monkey "louses" merely in order to find and eat the scales of scurf thrown off by the epidermis. But is this really established? I am inclined to doubt it. To begin with, let us consider the examples which have just been given. In the case of the doll's fur collar we have, so to speak, a purposeless lousing, behind which we may perceive the purely formal aspect of an inherited habit. At the same time, there was in this case something definitely playful about the action of lousing. On the other hand, in self-lousing, and the lousing of monkey-children by their mother, we see an expression of the instinct for cleanliness; and we must not forget that every animal that is subject to vermin tries to get rid of them; the mite-infested hen powders herself in a dust-bath, and so gets rid of at least some of the pests; the goat scrapes himself against a post, and the pig against the boards of his sty. In all such actions the urge to get rid of the vermin seems to be the primal and instinctive motive. And as in many of the social animals, so in the playful monkeys we see a tendency to mutual friendliness and accommodation. But this is by no means to deny that the monkey may

louse for the sake of the small reward to be obtained in the shape of scurf. This is one of the reasons why monkeys, which in captivity are very often free from vermin, continue to louse themselves and one another.

Our horses have some remarkable habits, which may doubtless be traced back to their wild state. As true social animals they grew to maturity in herds, almost defenceless against the greater carnivora, and accustomed from youth to comradeship. They are attached to their stable, their stall, and are discontented if they are removed to a strange stable. Horses often make it almost impossible to rescue them in case of fire, by frantically rushing back into the burning stable, from which they have been removed with the utmost difficulty. Such peculiarities give rise to various stable habits, with which every cavalryman is familiar. And we see the ancient herd-instinct at work when, as often happens, a horse is unwilling to leave the squadron when it goes into action, so that the rider finds it difficult to bring the horse out of the ranks.

We often hear the experts say that the horse is a creature of habit, and there is a great deal of truth in the saying. That is, the horse shows little inclination to abandon habits once acquired, or actions which we ourselves have taught him. In such processes *imitation* plays an important part.

Thus, the foal imitates the so-called vices of the dam. That is, it not only notices bad habits, but acquires them, and those who do not witness the formation of such habits are inclined to regard them as inherited. On the whole, every great stable in

which the horses stand idle, spending little time in the open air, is liable to become a school for the formation and propagation of equine vices. Any bad habits that make their appearance are infectious: for example, plunging, kicking, and biting.

Of my many experiences with animals one of the most interesting was that with a Squacco Heron. It was in the Tihany Institute for Biological Research, where I was at one time working on the ground-floor, but afterwards, for various reasons, removed to the second story. The new environment aroused the keenest interest in the heron, who had grown up on the ground-floor; he went up to each individual piece of furniture or apparatus or instrument, and walked round it, but found that things were not so comfortable as downstairs, as I presently realized from his restlessness. Finally he flew back to my shoulder, the only resting-place of which he approved. A little later, when I left the room with him and happened to pass the downstairs laboratory, he flew off my shoulder and took up his position before the old door, as though begging for admission. This behaviour was repeated several times a day, for six days in all; a sign of the great attachment to locality which we have already found in many different animals.

Apart from the attachment to locality, this behaviour reveals a considerable spatial sense and a good memory, for the Institute, in all its various departments, possessed a number of doors of similar size and colour. Undoubtedly the attachment to locality constituted the emotional basis of this discovery of the right door.

We see the most striking expression of this inherited and conservative trait in the attachment to the dwelling-place in the more restricted sense—the nest or den, when the animal is living in the natural state. But even in captivity such a tendency operates in the customary manner (page 8). By all my charges, whether birds or mammals, the allotted kennel, the appointed nest, was regarded, after the lapse of a few days, as *the* kennel, *the* nest, and treated as the only sleeping-place and refuge. For the little herons of different species, which I took directly from the swamp, placing them, perhaps ten hours later, in a box filled with wood-wool, this box became the place of safety in which, for weeks to come, they took refuge from any suspicious sound or threatening danger. My wolf slept in his travelling-box until it became too small for him. Young carrion crows, short-eared owls, and other birds behave in the same way. A little squirrel, which I found lying helpless at the foot of a tree, and put into a pocket of my wind-jacket, where I allowed it to live for a time, regarded this pocket as its living-room, and my person as a tree-trunk. It would clamber over me in all directions, always returning to its hiding-place, where it slept. Later on I had some difficulty in accustoming it to another bedroom. Another young squirrel had a cardboard box placed at its disposal, to which there was only one opening—at the top. It lived in this box for years, and even made certain convenient alterations. It cut openings, with its teeth, in two opposite sides of the box, so that it now had its own entrance and exit, as in its arboreal nest.—

Foxes, which could have escaped from my garden whenever they chose, preferred, if they were pursued, to retreat to the kennel, as their permanent residence.—All my animals become visibly uneasy if I remove their nest, or box, or what not, to another room of the house, or if I change them from one kennel to another. Under such circumstances one of my badgers returned to his original quarters, with the whole of his bedding of hay and straw. Another, whose cage, in the garden, had a floor-surface of something like 80 square feet, found this lodging too restricted, and excavated two burrows, one of which came to the surface outside the cage. Leaving by this exit, he went for a walk every night (as I have already recorded), so that he could easily have escaped for good; but he remained faithful to his home. One of my foxes once escaped, but instead of making use of his freedom he went back to his old kennel. It is possible, of course, that some noise made him return.—When the monkeys now and again rapped at the door of my study, and were threatened with a rod, they immediately fled back to their house, although they might have gone into various other rooms of the house, or could have climbed the trees in my own or my neighbour's garden.—These common characteristics of animals of the most dissimilar species are unaffected by their otherwise great dissimilarity in psychic behaviour.

How greatly we human beings value our own habits is apparent from the fact that even in childhood we are trained to form a number of such habits, which are confirmed by practice. The

pedagogues have made a special study of the control of habits, with a view to ensuring dexterity and promptitude in certain actions; so that we regard habit as an important means of education. Research is undertaken into the psychological origin and the laws of habits, in order that the results of such investigations may be applied to the child.

When we speak of the habits of animals we must not, of course, compare them with those of human beings. Yet in some respects comparison is possible, even of physical habits. For example, we can educate not only our children but also many animals in such matters as cleanliness and the like—or, as we say of animals, we can train them.

14

ALI, MY DOG

★

MANY people flatter themselves that theirs is the cleverest dog in the world. I think one should allow them to continue in this naïve belief, since the dogs in question are likely to fare better than they would if their owners thought them stupid. No lover of animals will really object to the dog-owner's pride in his favourite.

If in these pages I erect a little memorial to Ali, I feel that I am fully justified in doing so, though he never struck me as being excessively intelligent, was not remarkable for an especially affectionate nature, and often disobeyed me. In reality he possessed only two qualities which I valued highly: his great availability for experiment—he was the laboratory dog—and his faultless behaviour to my other animals. He was loved by almost all of them. If we were to translate their relations into human language, we should have to say that he was their confidant.

I had already owned many dogs, both pure-bred and mongrels of indeterminate lineage; a terrier bitch was the smallest and a Leonberger the largest. They all enjoyed a long life, and they either died of old age or, their digestion failing, had to be put away in order to shorten their sufferings. They were one and all good dogs; one of them even saved me from deadly peril.

Ali I acquired out of pity from a small dealer, on whose premises he was leading a miserable existence, always on the chain, in the company of about a dozen comrades of various breeds. His mental depression was unmistakably revealed by his attitude and behaviour, yet his expressive eye gave hopes that he would soon recover his spirits. I felt that something could be done with him if he were treated with kindness and understanding. And here I was not disappointed, as I shall show. Officially Ali was described as "Ratcatcher, pepper and salt." As to his age and ancestry, I could, unfortunately, obtain no definite information. The dealer gave his age as two years, to which, in silence, I added another year.

It was now my task to ensure the physical as well as the mental welfare of the dog, and above all to cure him of his almost hopeless depression. Ali could utter only three species of sound: a low growl, a faint whimper, and a short bark: little enough for a dog in the prime of life. Here individual treatment was needed in order to cure the poor beast of his inhibition, and enable him to live a joyous, cheerful, and untroubled existence. I value *joie de vivre* and cheerfulness in animals of every species, for these are the qualities which make them lovable. Ali retained only one peculiarity, or, rather, a not altogether pleasant habit, of waking me every morning, summer and winter, at three o'clock. For four years he came at this hour to my bed, or, if I had locked the door, he scratched at it and woke me by whimpering. Perhaps he once had a master whom he was obliged to wake at this hour.

Within a month Ali had become a cheerful dog; he had now a great vocal register, and, above all, at the beginning of every walk he broke into a by no means pleasing, indeed absolutely distressing, howl of joy. The number of sounds which he used to express himself gradually increased to more than thirty, so that I was able to arrange them in a systematic vocabulary. Of this I shall say something later. Strangely enough, Ali's need of society was one of his chief characteristics; he was known far and wide, and generally liked for his nice manners. If I happened, now and again, to enter some village hostelry in his company, I was asked if by any chance the dog was mine; they had known him for a long time, and he often came to the kitchen window.—Again, here in Solln a lady once asked me if I knew whose dog Ali was? For every morning this dog came to fetch her, and escorted her to the church, and when mass was over he was still there, waiting to take her home! I suffered these excursions of his in silence; after all, they were simply fantastic, scatter-brained rambles. But I do not advise any dog-owner to permit such proceedings. Ali, however, as I shall show, gained in respect of his psychic development by this unbridled behaviour.

But first the question arises, how did the dog come to make such excursions, seeing that he, like all my animals, had a comfortable home? Here is the explanation: As a matter of principle, I have never yet trained an animal, for in training it I should subject it to my will, and then, to my thinking, it would no longer be *genuine*. An animal's psychic development is greatly restricted by train-

ing; the will imposed upon it would suppress its own psychic states, functions, emotional values, and so forth, to its own disadvantage, and to mine also, as observer and experimenter.

After he had been with us for a few months. Ali, in his great sociability, attached himself to the *masses*. If any sort of company, whether of soldiers, hawkers, or musicians, whether making music or not, passed the house, Ali had to join them and run off with them at a venture. This voyage into the blue ended in some beer-garden, where the dog, as the last customers to leave the place informed me, remained until midnight or one o'clock in the morning. There was no burning of midsummer beacons, no children's school-treat at which Ali was not present. Sometimes he marched at the head of the procession; sometimes he brought up the rear. As a notable jumper and climber he never disturbed us by barking at the garden door; such an obstacle as this was easily overcome.

He soon came to understand the various means of communication—and the railway soonest of all. His purposeful fashion of entering a train is shown by the following incident: In the Grosshesselohe station, where the rail-cars from Munich cross those coming from Höllriegelskreuth, I sometimes took the car for the latter station, entering the last compartment. Ali noticed this, and only the second time, as soon as the car stopped, he jumped into the last compartment; but he never got into the other car, which was going to Munich. If this happened to come in first the dog did not get into the car, despite the open door, but waited for the

arrival of the car coming from Munich, when he made his way to the last compartment, without taking any notice of me. I used to make this journey, together with my family, once or twice a week, according to the weather. But even if I had not made it for five or six weeks, Ali knew what to do as well as though only a few days had elapsed since the last journey. In the car, just as in the beer-garden, Ali made friends with everybody, and so wherever he went he enjoyed the reputation of a well-bred and amiable dog, although I had done nothing whatever to educate him as such.

Ali was also comparatively quick in understanding the traffic regulations on the highway. It was really remarkable to see the matter-of-fact way in which he always ran on the right side, close to the edge of the road, never looking round even when cars were hooting and coming up behind him, and never suffering any injury. He behaved in this way not only here at home, but also on roads which were quite strange to him, when he was often a hundred yards or more ahead of me.

Like many other dogs, Ali had the habit of hurrying on ahead of me when I took him for a walk, and waiting for me at street-corners, or even looking round at me before he came to them. He merely wanted to learn which way we were going to take. On such occasions he would fix his gaze upon me at a distance of twenty to thirty yards, and I had only to point in the desired direction with my stick. I never trained him to observe such optical signals; this silent dialogue was quite spontaneous in its origin, and he never

took the wrong turning. The indications of the walking-stick were followed as readily as the hints of a pointing finger indoors, when his attention was called to his food or his bed, or perhaps to some conspicuous object which he had never seen before. The wooden semaphore was obeyed as though it had been a finger. To me, it was always astonishing to note how perfectly Ali understood these indications. In the city I constantly had occasion to remark that many human beings were less quick to understand the signs of the traffic policeman (for this was before the days of light-signals) than Ali was to grasp the meaning of similar indications on our country highways. Ali's understanding of the nature of traffic was undoubtedly remarkable. He was, however, by no means singular in his ability to take the right railway-train, for I have known other dogs to perform similar feats. There are actually independent canine travellers on the railways and electric tramways, who have formed the habit of travelling of their own accord, and even without the knowledge of their owners (see page 212). All these animals are distinguished by remarkable powers of memory. Indeed, we may even go farther, and say that Ali's behaviour presupposes a sort of twofold recollection; first, he entered a railway-carriage of his own accord, and secondly, he got into the right carriage. If, as I have described, the two rail-cars entered the station at the same time the case was still more complicated, as the right car was hidden by the car bound for Munich. Even though Ali might be standing before the open door of the wrong car, he did not board it,

but waited until it pulled out, or else he ran round behind it, and had already taken his place in the right carriage when I appeared.

Of course, the instinct of orientation (sense of direction) may have played its part in Ali's behaviour, for in this respect all dogs are greatly superior to human beings, but even allowing for this the dog's achievement was worthy of note.

The following of the indications of the finger or walking-stick confirms my previous experience of the dog's great powers of observation. I have found by experimenting with my other animals—for example, Caro or Wolfie—that the least twinkle of my eyes does not escape them. In view of such performances Ali's unintelligent behaviour with the fragment of cake (page 152), which he tried in vain to bury by scraping at the floor, is all the more remarkable. What strange riddles our animals are always presenting to us! The very things that seem to us so simple and inevitable are difficult to them, and the things that we regard as difficult are often quite easy to the animal.

Ali had a very definite sense of time. Whenever I went into the city he punctually repaired to the station to meet the train by which I usually returned; if I did not come by it he waited until the next train arrived. If again I did not appear he would come to the station a third time. I often took him to the city with me, but only for experimental purposes. He soon realized whether or not he was to come. He did not much like the city. If I left the house carrying a portfolio he never accompanied me, even if I invited him. If I pulled him along with

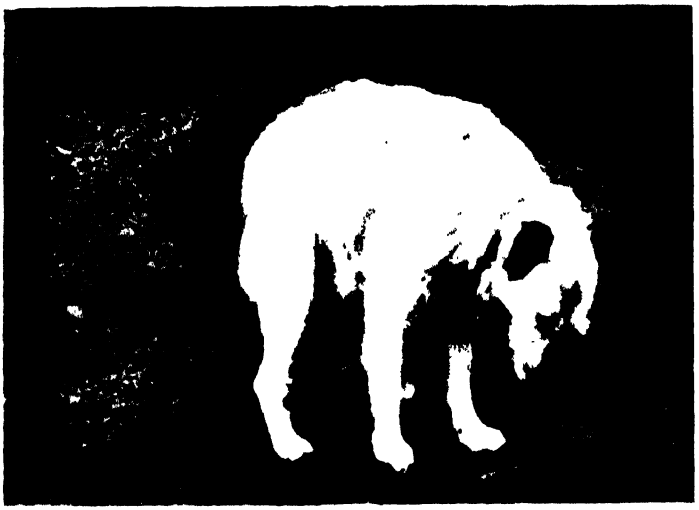

Plate 40. Ali receives a scolding, and draws himself together as though he were being beaten

Plate 41. Now he looks cheerful, and will be off and away directly.

Plate 42. Ali comes to see what is happening, and one of the kittens gives him a friendly reception.

Plate 43. The sun is too hot for the lamb, which is only ten hours old ; the ewe shades it with her head.

me a little way on the lead he turned back the moment I released him. If I happened to pick up my stick as well as the portfolio nothing would induce him to leave the house. The walking-stick without the portfolio meant a walk: then he needed no further invitation.

At a certain hour of the afternoon I always went to the post office. The dog knew the time to the minute. If there was any accidental or intentional delay he became restless, jumped up at me, whining, and ran uneasily from me to the door and back again, until I was ready to go. Even the stick was not necessary then; a letter in my hand told him everything. If I laid the letter down again Ali was painfully disappointed; sometimes he even put his tail between his legs and crept off to his rug.

As I have stated, Ali was an excellent subject for experiment, and was admirably qualified to help me with my phonetic investigations. A well-known professor of phonetics and two musicians remarked on several occasions that on howling Ali produced an exceptionally good "u"; indeed, in respect of the purity of the vowel he excelled many human beings, including myself. Another of his gifts was an original faculty of expression (Plates 40–41).

The vocal development of his different kinds of bark, howl, yelp, whimper, snarl, and growl, his ingratiating, easy-going nature—and also his unbridled independence—his way of discovering buried bones which his comrades had hidden from him, and many other characteristics which are not found in the average dog, must be attributed

largely to the unrestricted liberty which he enjoyed. He roamed as he pleased about the streets, meadows, fields, and even woods, making the acquaintance of man and beast; he found pleasure in my society, and I in his. I know very well that the city-dweller cannot and should not suffer the masterless dog; on the other hand, what a dog is depends on what his master has made him, or what he permits, and how he treats him. The model dogs who always keep to heel are not among the happiest of animals, and can give us little of their inner natures. In many respects their masters have failed in their duty to them. Valuable as Ali was to me as a subject of experiment, he was even more precious by reason of his behaviour to my various four-legged housemates. To Ali, as I have shown, little was forbidden, but one thing was strictly prohibited: he must never injure the birds or animals in the house or garden. This I impressed upon him with a single word: and that word was "Not!" It sounded like a peremptory command. "Not!" meant: "You mustn't do that!" and was uttered in connection with a stern gesture.

Out in the open, beyond the garden fence, Ali chased all sorts of animals, and appeared to derive great satisfaction from their flight. Among them were squirrels and cats, and also blackbirds, crows, and other birds. But he never caught any of these creatures. Indeed, I could see from the way in which he checked himself that he did not really want to catch them. Now and then he killed a mouse in the fields, but without eating it. Indoors things were very different. Here every newcomer

was introduced to him, and every sign of hostile behaviour was nipped in the bud by a "*Not!*"

Often Ali formed a lasting friendship with some other animal, and in this relation he was always the giver. There was something touching in his behaviour to a sick cat of mine. Whenever the poor creature lay writhing in convulsions he licked her little head, and her whole body, and later on, when this same cat had kittens, he saw to it that they were washed every day: that is, he licked them all over, while their mother confined herself to suckling them (Plate 24). My fox-cubs, too, had a good foster-father in Ali. He treated them as he treated the kittens—but only so long as they were still drinking milk. Directly they were promoted to a flesh diet, and in consequence began to develop the characteristic odour of the fox, he avoided the little creatures. But he treated the squirrel just as he had treated the kittens—and not only the squirrel, but also my young birds: the woodpecker, the cuckoo, the cole-tit, the carrion crow, the jay, and even the falcons were licked. There was only one creature that he avoided, and this was the badger, who had a grudge against all things living. The unpleasantness between them was ended only by Brock's death.

It was not that Ali always made friendly approaches to the animals; very often he was passive in his attitude to a new acquaintance; he waited to see what would happen. Sometimes the advances were mutual; sometimes the stranger made offers of friendship to the dog, and sometimes the dog approached the stranger. Perhaps the most

remarkable instance of such friendly relations was the acquaintance struck up between Ali and the two monkeys, Mako and Java. Both these monkeys were avoided by all my animals, and with very good reason; they were really to be feared, and many of my pets bore some mark of an encounter with them. Ali at first kept out of their way. Then one day they broke out of their cage, crept into his kennel, began to louse him, and then swung themselves up into the trees in the garden. Once more they escaped, without my knowledge. I was in my study; I heard a scratching at the door, opened it, and saw, to my surprise, Ali, who entered the room, followed by Mako and Java, who were holding hands. The dog, acting as their guide, ushered them into the room. Since they began to squeak and screech as hideously as only monkeys can, I scolded them until they left the room abashed, without having broken or damaged anything. Ali, however, remained with me, and lay down on his sleeping-rug.—His behaviour to the little Howler Monkey was really touching in its kindliness, as I have elsewhere described.

Ali never allowed himself to be "put upon" by other dogs; and even when fighting a sheep-dog he could give a good account of himself. In such cases he would quickly throw himself on his back, and cleverly defend himself in that position. At certain times of the year he stayed away from home for nights together, and he bore many scars as mementoes of such adventures, but even as an elderly dog he could still tackle our fence, which was 5 ft. 4 in. in height.

Beyond question there are among animals not only individualities but also personalities, and Ali was a personality. In saying this I have in mind his behaviour to my animals. It is well known that our sheep-dogs conceive an affection for certain individuals of the flock—pet sheep, so to speak, with whom they deal more gently than with the rest. But here we have the case of a trained working dog and animals all of one species. What it means for a dog to mingle with creatures of the most different species—such as monkeys and falcons, foxes and herons, cats and cuckoos, etc.—to care for them and make friends with them, never biting one of them, but always keeping his temper, always good-natured—this can be rightly estimated only by one who knows how the animals in question behave among themselves. Many of them were permanently enemies. There were naturally cases of mutual aversion among them; between the fox-cubs and the kittens, the Macaques and the Howler Monkey, the various herons among themselves, the jays and magpies, etc. But for all of them Ali was a central point; he was their "confidant"; even the herons grew accustomed to him at last. And is it not strange that the many people who knew him, and who were very far from always agreeing together, were all, without exception, fond of Ali?

15

MOTHERS AND FOSTER-MOTHERS

★

Of the legendary pelican it was related that she gave her life for her young, tearing her breast and giving her offspring her heart's blood to drink. The heroine of this ancient tradition became the symbol of the noblest self-sacrifice and charity. In the year 1884, during the great epidemic of cholera in Naples, when a number of devoted nurses fell victims to the insidious malady, a monument was erected in the Villa Nazionale, which represents a pelican as a symbol of maternal love. The bird is shown as sacrificing her life to her young in the legendary manner. Animal mothers are not only the subjects of some of our oldest myths and fairy-tales, our wisest proverbs, and our most ingenious fables; they also provide motives for the plastic arts. In the fables they are cunning and eternally feminine; in the fairy-tales brave and ingenious, but also kindly and upright.

Meanwhile, for us, at the present day, the scientific conception of the animal mother, the meaning and importance, the task and purpose of the female, is especially worthy of study. In accordance with their vital purpose, the mothers are not only different in form and structure from the fathers—they are also psychically different, having qualities which are lacking in the male. When the mother

dies an early death, conditioned by the laws of her species, everything is done by instinct in order to provide the future young at least with food and shelter—as we see, above all, in the world of insects. In the Bee and Ant states and elsewhere the mother's labours are so stupendous that the functions of maternity have to be divided. The queen has merely to lay eggs, while the workers—who are abortive females—retain, of their femininity, only the instinct to tend and provide for the young. On the other hand, the feeble-minded males are completely excluded from any care of the young. And so, among the insects, we find all along the line that the male is banished from psychologically important fields of activity, as we see in the Bees, the Ants, and various other species.

A remarkable figure among the mothers of the lower strata of the animal world is the spider, *Trochosa signoriensis* Lachsm., which is found in the South Russian steppes, the Balkans (round about Orsova), and in the soil of the Hungarian lowlands. It seems to be especially frequent in the loess escarpments around the city of Szeged (Theiss). I repeatedly met with one of its relatives on the Tihany peninsula, which runs out into the great Plattensee (Lake Balaton), and I often found it quite close to the Institute.

This spider lives in tubes which penetrate the soil to a depth of six to twelve inches. They are generally vertical, and their diameter is about an inch. Young spiders begin to plan their dwelling on quite modest lines to begin with, the earth being brought to the surface crumb by crumb and

scattered around the orifice. The spider tapestries the interior of the shaft with a delicate silken lining, in order to avert the danger of subsidence. Towards autumn, when the *Trochosae* are preparing to hibernate, they stop up the entrance, and are not visible again until the spring.

In the imposing egg-cocoons of the *Trochosa* as many as 360 eggs have been counted. The mother carries her young about on her back after they are hatched, and the little spiders not infrequently leave their lofty perch, running to and fro, spinning little threads, clambering up their mother's legs, and at last returning to her back. First and last I encountered at least half a dozen of these spiders, with or without their young, and now and again I took one captive. When such a mother spider is caught some of the little ones are scattered. I usually placed the little creatures in a terrarium, where after an hour or so they had forgathered again on their mother's back. It is interesting to watch them taking their places on their parent. In order to make room, the spiders of the lower strata tuck in their legs; but the taller it grows, the more singular is the appearance of this black cone, or perhaps one should say, this blunt pyramid. The spiders of the upper tiers have to extend their legs in order to hold on to their comrades, so that those at the very top have to spread them out to the uttermost in order to anchor themselves and brace the whole structure.

But we need not go to Hungary or the Balkans in order to see a spider-mother with her young. Even hereabouts there are such spiders, valiant in the defence of their cocoons; as, for example, the Wolf

Spider with her sac of eggs. She too carries her children about with her; but the Wolf Spider and her young are very much smaller than the *Trochosa* and her brood, and do not offer us such a striking spectacle.

From all this it appears very clearly that even among the lower animals maternity makes the most astonishing provision for the future, and in this respect the insects surpass many of the vertebrates (fish, newts, reptiles, etc.).

If we now consider the functions of maternity among the warm-blooded creatures, we shall find, of course, among the birds, male parents who take entire charge of the business of incubation; but these are insignificant exceptions. And even when the male parent does his part in this respect, the main business of brooding is undertaken by the female. Of the endurance with which a mother will sit upon her eggs, and feed and protect and defend her young, our domestic hen is a shining example.

But the mammal is more closely plighted to maternity than the bird. For here, where there is no period of incubation, and the young are carried in the mother's body, and must be suckled after birth, the fathers, in many cases, do no more than defend the young, or at most the carnivora will carry home their booty to divide among them. On the other hand, there are actually cannibal fathers: for example, our tom-cats, from whom their children are not safe. The mammalian mother is a plentiful source of nourishment for her children; she cherishes them and defends them against overwhelming odds; and in a state of Nature she is

usually their teacher. If, for example, you have ever watched a mother cat with her kittens you know what care she lavishes upon them. If for any reason their sleeping quarters are not suitable she removes them to others. To this end the little blind creatures are carefully lifted by the scruff of the neck and transferred to the new home. And woe to the dog that crosses the mother's path! He may even risk losing his eyesight, as a dog of mine learned to his cost. We never find the kittens' bed unclean; all are carefully licked, from head to tail, several times a day; indeed, the mother even contrives to remove the little creatures' urine and faeces until they are able to relieve themselves on the surrounding soil.

We see that dogs, cows, goats, and sheep are no less diligent in licking their children. This maternal duty is performed in the meadows by our ruminants. If the sun shines too fiercely on the young lamb, the mother will often stand over it and cast her shadow upon it (Fig. 43).

I stand beside an old barn and watch the rats at play. An old rat with six or eight young comes cautiously out of one of the many holes, which makes us suspect a whole system of subterranean passages. And now they begin to frolic. The little ones run to and fro, spin round and round, clean themselves, begin to chase one another, indulge in little climbing exercises, and even follow their mother up the almost perpendicular poles leaning against the side of the barn, clambering on to the roof, where they ramble about and race one another. Down they come again, cautiously, head first, and disappear; but they soon show them-

selves anew, eat something they have found, wash their faces with their fore-paws, suddenly rush away, and again reappear. Now the old rat comes a little farther into the open, suddenly stops and listens, and runs toward the barn; and although no visible signal was given, all her youngsters have vanished before she reaches it.

Mother badgers and hedgehogs lead their young out into the fields, and call a halt wherever there is anything to eat. If there is danger anywhere the badger, according to my observations, lifts her right paw and sniffs the air—a sign that all must keep still. If needs must she will face the enemy.—On warm July and August evenings the hedgehog punctually leaves the compost-heap with her five youngsters, and leads them about the garden. First she calls a halt at the saucer of milk which I have put out for them; then they wander on to one of the plum-trees, and an early apple-tree too has already shed some of its fruit. Earthworms are relished, a toad is pestered, a mouse squeaks, and since the animals have already grown used to me I am able—provided I tread softly—to see many things which were formerly hidden from me.

It is a long way from the smaller insects and the spider-mothers to the mammals. But from end to end of the long journey we see motherhood manifest itself in the most diverse forms. And at every stage of the journey we see *instinctive* provision for the young which the mother may never see; deprivations of every kind; self-sacrificing care, and defence of the offspring at the cost of life itself. All these mothers serve one purpose, work towards one ideal,

are unconscious incarnations of a principle rooted in Nature, which uses them, as individuals, in the service of the species. The mothers are a means to an end, so that the symbol of the self-sacrificing pelican contains a nucleus of truth. Mothers are kind to their children, and put up with a great deal from the unruly life to which they have given birth. In the children life is rushing onwards. Hence their vehement drinking, which results in a visible decrease of the mother's energy if the children are numerous. But the immediate future belongs to the waxing life, and age must renounce and withdraw. For the life of a species is like a long, invisible chain, at every individual link of which a new flame of life is kindled.

Next in rank to the mother is the foster-mother. We often see a hen act as foster-mother, with little ducklings in her care. She has no easy time of it, this foster-mother, for the instincts and habits of her charges are quite unlike her own, and unintelligible, and she cannot follow the little creatures. Hence her excitement, and her incessant call-notes, when the ducklings gaily swim about the pond or brook. Sometimes she will even attempt to enter the water herself. A hen will sometimes hatch a covey of partridges, and will lead them about and warm them as though they were her own chicks. But one day her charges fly away, and are seen no more. Mother-cats and bitches are often employed in zoological gardens to suckle the young of various carnivora, and even rabbits and hares have been reared on their milk. What is more, they have actually tried to mother chickens.

A strange case of foster-parentage which I once observed was that of a female cat. A half-bred Angora, she had two whitish-grey kittens, three weeks old. Her owner possessed another cat, the mother of a black and white kitten. Once, when I borrowed the three kittens for experimental purposes, and then put them down in their owner's garden, the two mothers suddenly appeared. But while one of them timidly withdrew and fled back into the house, the half-bred Angora went up to the kittens, carried off her own, one at a time, and then came for the third, the offspring of the other cat.

I took the kittens again, and noticed that the cat which had fled was nowhere to be seen. The other cat did precisely what she had done before. And when I took the kittens a third time the same thing happened again. The remarkable thing about this incident was the care of the half-bred cat for the offspring of the other cat, who in her alarm had deserted her kitten.

Another example: Among my hens were two which had been good friends from a tender age. They were birds of the same breed, and the same brood. When one of them brooded for the first time, and began to lead her chickens about, her friend kept always at her side, calling to the chickens, just as she did, in order to give them some titbit. On the outbreak of a thunderstorm she even took some of them under her wings.

Not every cat or every hen is prepared to act the foster-mother in this way; but the willingness to serve individuals of another species exists, and has its foundation in the maternal instinct.

16

HOW DOES THE DOG FIND HIS WAY HOME?

★

It is a fact which has often been confirmed that dogs which have been sent away from their owners, and transported over great distances by road or rail, will sometimes find their way home again. In many cases the distance has been as great as fifty miles, and the country traversed has been quite unfamiliar. That most of the stories of dogs which return from great distances are exaggerated, if not wholly invented, does not alter the fact that some dogs do find their way home again.

Strangely enough, neither scientific nor cynological literature records any systematic experiments relating to the dog's sense of orientation. No one has inquired as to the manner of the return, or the behaviour of the dog while travelling, or whether a direct or roundabout route is followed, or if intermediate halts are made in villages or woods, or on heaps of straw, etc.

For some years I had felt that this problem of the dog's sense of orientation ought to be carefully investigated. In October 1931 I carried out some practical experiments, and published my results.[1]

I had realized beforehand that such experiments

[1] In the *Zeitschrift für Hundeforschung*, vol. 2, pp. 133–156. With three illustrations and four plans.

could not be carried out by a single observer, but that a considerable apparatus of trained kennelmen, vehicles, and observers would be required. Preliminary arrangements had to be made with dog-owners, gendarmes, and other persons who were familiar with the dog in question, and his behaviour to the family, strangers, and children, and other dogs, and were also aware of the degree of his attachment to his home or farm. Many questions had to be asked and answered: how long the dog had been in the possession of its present owner, whether he was given to roaming, whether he was addicted to hunting, or to biting, and to what extent he had covered the country surrounding his home (with and without his owner), and so forth. Further, we carefully reconnoitred the countryside in various directions.

The subject of the experiment was packed into a travelling-basket; this was placed in a closed motor-van, and the journey to the starting-point was made by a zigzag and roundabout route, avoiding the road which the dog might be expected to follow.

Great care must be observed in following the dog after his release, lest he should be forced off his route; he must not have any notion that he is being followed. For this reason the rate of progress, the distribution of cyclists, signals, observers' beats, etc., must be agreed upon beforehand.

Altogether I made nine experiments with three animals—a dog, a bitch, and a neuter. The dog and the neuter were farm dogs, the bitch was a town-dweller; and all three were sheepdogs, but were not pure-bred.

The dog, Max, whose home was at Puchheim, near Munich, was released in a countryside which differed in essential respects from the surroundings of his home. Puchheim lies in the plain, on the River Amper, while the dog was released at Rinnerhof, which is on a height, invisible from Puchheim, and divided from that village by woods and hills. Further, on the day of the trial (October 23, 1931) the sky was entirely overcast, and visibility was restricted. On the occasion of the experiment the dog wore a conspicuous, white-covered collar, from which an aluminium box was suspended (a despatch-case). This contained a paper on which were noted the name and residence of the dog's owner, the whereabouts of the gendarmerie-station of the district, with its telephone number, and the statement that the dog was the subject of an experiment. Neither on the preliminary inspection of the dog nor during the course of the experiment was he to be called by his name by any of the persons taking part in the experiment. The cyclists who accompanied him were not told his name. The persons who took part in the experiment were neither friendly nor harsh to the dog, but preserved an attitude of complete indifference. Along the route covered by the dog loud speaking was prohibited, and as far as possible any speech was to be avoided.

All the observers had long experience of dogs, and I gave them detailed instructions before the experiment. They were to note the dog's bearing, the way he held his tail (whether high or low, and whether or not he wagged it), the distance of his nose from the ground (whether held low or high),

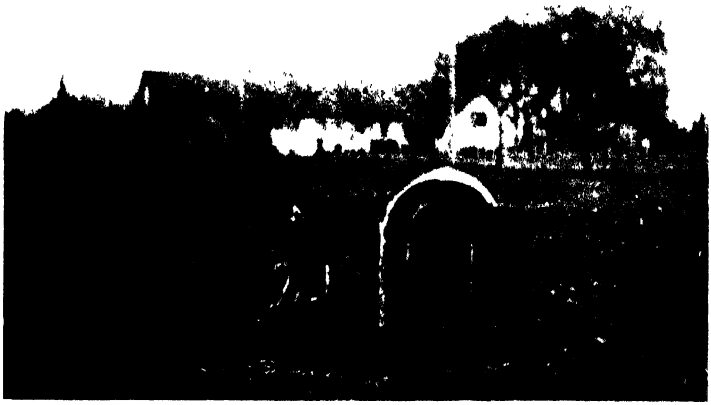

Plate 44. Max has left his basket, and is now distrustfully examining his new surroundings.

Plate 45. Nora has returned home by a route unknown to her.

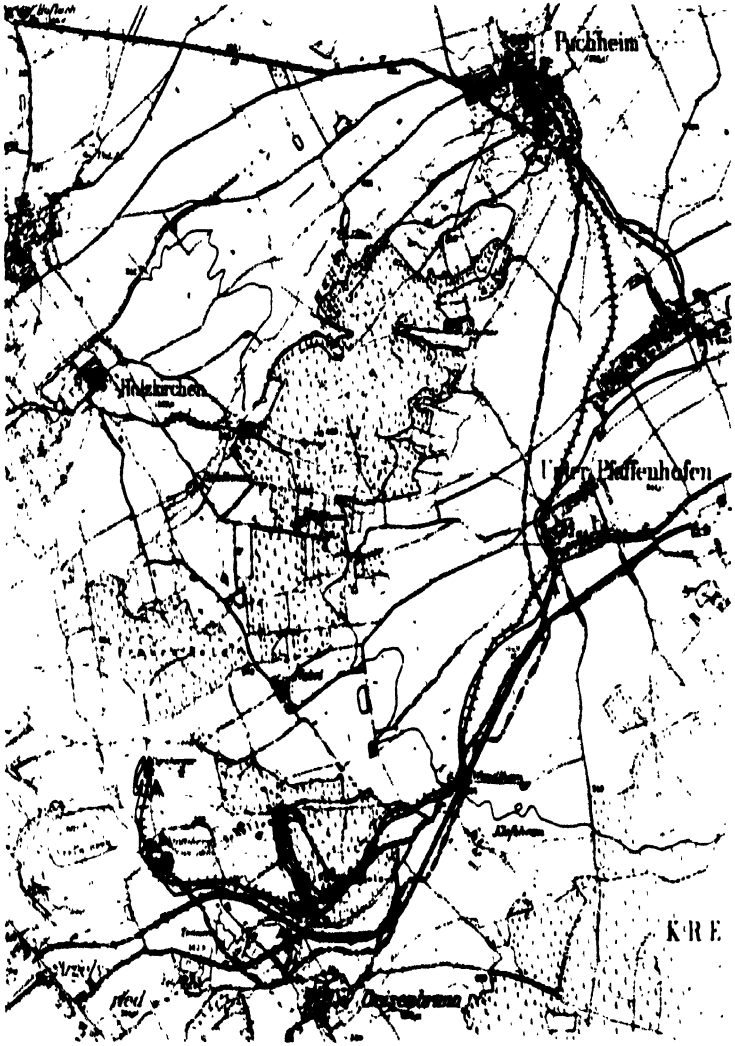

Plate 46. Experiments with the dog Max:
1st Experiment, 23.10.31 ———
2nd Experiment, 7.11.31
3rd Experiment, 28. 9.32 — - — -
The dog was released at A.

whether he followed trails or sniffed the air, where he left tokens of his passage, etc. They had also to mark his attitude towards the high-road and other thoroughfares, the railway, the tram-lines, motor-cars, carts, bicycles, human beings, dogs, and other animals.

We reach our destination. At 9.35 the travelling-basket is opened (Plate 44). Timidly and suspiciously the dog, who has never before travelled in a motor-car, leaves the basket. Presently he scans the unfamiliar landscape in various directions, and for a few moments he continues to gaze in the direction of his home. It is as though something were at work within him. No doubt he is taking his bearings in this new environment, so different from that of his home. We onlookers have no interest for him, nor has the barking of a neighbouring farm-dog. In his bearing and expression—as when he was released—he is more like a wild dog than a domestic animal. Involuntarily one thinks of a beast of prey, living in a state of nature and taking his bearings. Gradually his irresolution becomes less visible. After a few trials he concentrates visibly on the direction of Puchheim—which, as I have said, he cannot see—and now faces directly towards the wood and his home. At 10.05 he moves off: that is, half an hour after his release.—As the reports and the map show, Max avoided all the woods, with the exception of a small spinney into which he was forced by an approaching car—for he always did his best to avoid vehicles of any kind. In the same way he avoided the farm-houses and villages; whenever it was possible to do so he

circumvented them. When he reached the last village before his home, and came out on to the familiar high-road, he galloped into Puchheim with uplifted tail, arriving there at 11.13. (He was released at 9.35, so the duration of the test was 1 hour 38 minutes, while he was actually travelling for 1 hour 8 minutes.)

I now asked myself: How would he behave if the experiment were repeated? Would he remember the route he followed? It was impossible to say beforehand, so eighteen days later, on November 7th, I released Max again from the same point; part of the journey thither being made over different roads. The first time it was half an hour before he could make up his mind to start; this time it was only five minutes. As may be seen from the map, for the greater part of the way his route was unmistakably conditioned by the first experiment, so that this was actually a test of the dog's memory. Once he took a short cut which reduced the distance considerably. Altogether, this time Max was travelling for only forty-three minutes, as against sixty-eight in the first experiment.

A third test was made. On February 15th Max's owner changed his address and took Max with him to his new home. The new farm lay two and a half miles to the north-east of Puchheim. On the day of the removal there was a heavy fall of snow. The dog ran behind the cart to the new home. After this removal he never returned to Puchheim.

For the new experiment I chose May 7, 1932. The interval between the second and third experiments was about six months. The object of the

third test was to determine whether the dog would still remember the second experiment, or would follow a different course; and whether he would show more attachment for his old home or for his master. This time Max lingered for thirty-five minutes in the neighbourhood of Rinnerhof, was rather irresolute, and then, as in the two other experiments, moved off down the valley, hesitated, was forced in the direction of Geisenbrunn by all sorts of vehicles coming from Munich, then took his bearings again, and followed, as the map shows, a new route. Memory began to operate only when he came out upon the long familiar road, and he then made for Puchheim. Although there were strangers in the house and the farmyard, he felt quite at home, visited the house, barns, and stable, and wagged his tail when an acquaintance from the village went by. As we see, he had a good memory for persons as well as places.

Once more, for excellent reasons, I packed the dog into his travelling-basket, and released him between Puchheim and his new home, Gröbenzell. Now he ran not to Puchheim, but straight back home. A hundred yards from his home he began to gallop and whisk his tail. He entered the farmyard at 10.58, and leapt joyfully at his owners. It should be noted that his master's house was not visible from the level of the dog's eyes, nor even from the car, as the high railway-embankment of the Munich and Augsburg line concealed the farm, which, moreover, lay in a depression. The dog covered altogether seven and a half miles in this third experiment.

The duration of this experiment from the moment

of release to the arrival of the dog at Puchheim was 1 hour 47 minutes, and he was travelling for 1 hour 12 minutes. To this must be added the eighteen minutes which lapsed after the second release, when the distance covered was between two and two and a half miles. In one respect the dog's proceedings differed from his behaviour on the two former experiments. Max betrayed some uncertainty soon after leaving Rinnerhof, standing still for a time on the sloping ground. Also, being forced away from the road, he made a circuit. He then came to the last houses of the village, where he once more took his bearings. Possibly he would have followed the old route if he had not been forced off the road. Now he had to follow a completely new course, but he still pushed on in the old direction (Plate 46).

This third experiment may be regarded as partly a test of orientation and partly a test of memory. A fresh orientation followed when the last houses of Geisenbrunn had been passed, and memory-pictures may have emerged in the neighbourhood of Unterpfaffenhofen. Or it may even be that the two processes occurred simultaneously.

Involuntarily we ask ourselves whether, and to what extent, nose and eye contributed to the final result. It was evident that Max made *no* use of his sense of smell, although this sense is so important to a dog. He did not even sniff at the trees beside the road near the place where he was released, although the dogs of the Rinnerhof farm doubtless left their tokens upon them daily. But if we consider the matter carefully we shall come to the

conclusion that there was no good reason why he should have used his nose. The picking up of a trail, human or canine, could mean nothing for a dog trying to return to his home. If he followed such a trail he would be led into some blind alley, and would then probably abandon the attempt to follow other trails. Moreover, there could not be many trails leading to Puchheim. Even the trails originally followed were apparently avoided later on, as they could not give any directional bearings.

In such cases the activity of the eye is quite unrelated to the sense of smell. The sense of sight, after all, does enable the dog to recognize highways, lanes, vehicles, villages, men, and animals. Such observations do exert a temporary influence in determining the dog's route. For example, Max left the roadway directly he encountered a vehicle or a human being. Nevertheless, his eyes did not tell him the most important thing—they did not determine his direction. There must therefore be some other sense, with other functions, which enables the dog to find his way home.

A subsequent experiment was intended to test the faculty of orientation in a town-dwelling dog, which was released in a completely unfamiliar part of the city of Munich. The subject of this experiment was the half-bred sheepdog Nora, whose age was two and a half years. Nora came into the possession of her present owner when she was fourteen days old, and four months later was taken into the heart of the city for purposes of registration; but according to the credible evidence of her owner, which was confirmed by a commissary of police,

she rarely went beyond the immediate neighbourhood of the house (Plate 45).

A city, and especially a capital city, cannot be overlooked from any particular square or street; if, like Munich, it lies in a plain, the differences of level are inconspicuous, and even where they do occur they cannot be compared with the country over which Max was tested. To my thinking, the restricted horizon and the uniformity of the houses, which may preserve the same style throughout the whole length of a street, would offer a dog released in the city much greater difficulties than the scene of the previous experiments. When Nora stepped out of the basket she found herself in a great square (Johannisplatz in Bogenhausen—and she lived close to the Tierpark). Streets ran from this square in various directions. Either they were not straight or at a short distance from the square they ran into larger streets, but did not continue beyond them, so that for a dog's eye the immediate environment was narrowly restricted. Nora, released at 4.30 on the morning of March 28, 1932, behaved very much as Max had done; she spent about twenty-five minutes in taking her bearings, looking principally in the direction of her home; then she trotted off, and kept to the right route. In the Tassiloplatz she was led astray by a frolicsome dog, and set off in quite a different direction. But after some time the homing instinct awakened in her. Now she took her bearings very thoroughly, although in the meantime she had been distracted by yet another dog, set off in a direct line for her home, came to the rapidly-flowing arm of the River Isar upon

which her home stands, and was about to plunge into the cold flood. Fearing for her life, I had her caught, and released once more in the neighbourhood of a little bridge, where she hurriedly took her bearings, and in a few minutes was with her master.

During a second experiment made with Nora, forty days later (June 18th, 4.0 a.m.), she was not disturbed by other dogs, who were all asleep. This time, like Max, she spent only five minutes at the point where she was released (the Johannisplatz), took the same direction as that followed on April 28th as far as the Tassiloplatz, where she had been diverted from her aim on the first occasion, and ran straight home. The duration of the experiment was 37 minutes as against the 93 minutes of the first test (including the time spent in play and straying from the direct route). The distance covered in the first test was 5¼ miles; in the second, just over 3 miles.

The three experiments with a neuter of nine to ten years, who lived on a moorland farm (March 19, 1932), were failures.

None of the dogs tested knew the district in which it was released; in each case its home was completely out of sight; and owing to the careful manner in which the test was carried out none of them could have felt that it was being followed or edged aside.

It was shown that the sense of sight (the senses of smell and hearing can be excluded) does not suffice to explain the enigma. In Nora's case there were screens of houses in the immediate neighbourhood,

which completely shut her in. When the dog was actually led or driven in the wrong direction (as happened with both Max and Nora) a fresh orientation soon resulted in the rediscovery of the way home.

The neuter, Lux, ran always in the wrong direction. What prevented the other dogs from doing the same?

Here we are confronted with an enigma, the mystery of *an unknown sense*, which one might perhaps describe simply as the sense of orientation. We find such a faculty of orientation among our domestic animals—most strongly developed in the horse, but our cats have it also. In the world of birds, those creatures which are not earthbound, it is still more conspicuously developed. I am thinking of the case of a Peregrine Falcon which flew from Düsseldorf to Gödöllö (page 59), and above all of the faculty of orientation to be observed in the migratory birds. We know to-day that young migratory birds such as nightingales, cuckoos, falcons, and others find their way, quite alone, for the first time, to North, Central, and South Africa. The mysterious fact about this procedure is that they set off suddenly and find the right way. This is confirmed by Professor J. Thienemann's wholesale experiments with young storks, which, "without any guidance," flew off from Rossitz towards the south or south-east, as each was released, without any confused circling or flying in other directions. All seemed to happen according to a definite plan, and this plan lies ready-made in the stork's mind.

17

EXPRESSION AND SOUL

★

BESIDES the world of light and colour we perceive in Nature a world of sound and harmony, a world that sings, whistles, trills, flutes, crows, cackles, barks, and howls, and makes other curious noises, which we call the voices of Nature, but which are emitted by some animal or other. For whom is all this intended? Are we to see in it a mere caprice of Nature, or is there something more profound and powerful behind these various notes and noises?

The sounds that we hear have the most varied significance. There is the courting song, the call-note of the male to the female, uttered by all manner of creatures, from the grasshoppers and crickets to the birds of every species; the mewing of the cat, the belling of the stag calling for a mate. Mothers speak to their children, and children to their mothers; we hear warlike challenges and laments, shouts of victory and howls of rage, cries of warning, and expressions of contentment.

In these pages I have often alluded to the vocal utterances of different animals. I have spoken of chickens who converse with their mother even before they leave the egg; of the warning cry of the brood-hen and the cock, and so forth. We have seen that the speech of animals does not have to

be acquired, but is innate, and that they understood one another.

Just as the hen can distinguish not merely the warning cry of the cock from his enticing call-note, but the meaning of each individual sound, so the chicken knows without being taught what its mother means by her calls and warnings. And conversely, every hen knows what the chicken means by its various notes. She knows the call of the chicken that is lost, and answers it, according to circumstances, with a tender call-note, or with anxious and excited cries; she knows what the screech of pain portends, and rushes towards the sound with every sign of excitement, her plumage ruffled and her tail-feathers outspread fanwise.

Even when the brood-hen plays the foster-mother to ducklings, if one of her charges is threatened we see the same behaviour, and at the same time the ducklings never fail to understand the meaning of their foster-mother's cries.

This example of the mutual understanding between creatures of different species is by no means unique in Nature. Consider the young cuckoo, with its extraordinary demands upon its foster-parents. This squalling brat opens his bill much more frequently than other young birds, so that the old birds find it difficult to keep pace with his desires when he actually exceeds them in size and weight. Many a little warbler, wagtail, or what not puts the physical needs of her step-child before her own. Sometimes the nursling will take to his wings prematurely, and will actually beg from other passing birds who have a brood

of their own to feed. They understand what he wants, and bring food to him. Observation of one of my own cuckoos has convinced me that the young bird's gape is quite involuntary, and the same is true of young blackbirds, carrion crows, owls, and other birds. My young ravens, for example, opened their bills and cawked whenever I passed by; they even gaped and complained in their customary way if my dog happened to pass, and the cuckoo begged of my young turkeys.

Last year, when a pair of blackbirds had built in my garden, I approached the nest while the parent birds were absent. The nestlings at once began to gape. Unfortunately the cock bird had caught sight of me, and immediately uttered a warning cry. About an hour later I crept up to the nest again, this time with greater caution, and I was not seen; but the young birds no longer gaped; they had been warned, perhaps for the first time in their lives; the warning cry had fixed itself in their minds, and henceforth they obeyed it.

Most of us must have heard the cry of fear uttered by a swallow when pursued by a hawk. The closer the bandit approaches, the more rapidly does the swallow utter its cries of distress. It does not cry in vain. With similar cries, its comrades at once come hurrying up, and not only swallows, but jackdaws and other birds assemble, drive the voracious hawk away from its victim, and even pursue it. From this and many other instances it appears that not only can animals of the same species converse, but even creatures of different species can understand one another through the

medium of certain sounds. If animals could not understand one another there would be little sense in posting sentries or appointing leaders, as chamois, marmots, and other creatures do. Among the ants mutual understanding is effected by the silent speech of the antennae, and the co-operation of the individual insects in the affairs of the state is entirely dependent on this *sign language*. Without this speech the state would collapse, or rather, it could never have existed.

Like our own speech, the language of the animals is intended for purposes of communication, although there is no similarity between human and animal speech. Our language is based upon words; we have words for concrete things—that is, for things which are perceived with the senses—and for abstract notions. It is always in a state of flux, always *becoming*, so that it changes, in the different nations, with the lapse of time. For example, our mother-tongue, five hundred or a thousand years ago, was very different from what it is to-day. No human being has an innate mother-tongue; everybody has to learn his native language, and he must learn it by way of tradition; and the entire English, French, or German language, like every other human language, is bound up with tradition; that is, it did not suddenly replace some other form of speech; but the old Middle English, or High German, or Old French, gradually transformed itself into the language of to-day. So we can say that speech is a vast psychological process which continues from generation to generation.

With the animal things are very different; as we

have seen, its language is innate. Those of my chickens, spoonbills, ibises, herons, etc., which were incubated in isolation, developed their vocabulary just as did my magpies and other Corvidae. Sometimes they took a few days longer to produce the warning note, but it always came. In contact with the mother-bird it makes its appearance earlier, as the mother warns her offspring, and they, too, if suddenly surprised, begin to utter the cry of warning.

Through all the countless thousands of years the language of the animals has not altered: whether it be the chattering of the anthropoid apes or the croaking of the frogs, it has always been the same. Some animals, such as hares and rabbits, have always had a few sounds at their disposal (according to my observations, 2 or 3), while others have had more. Only our domestic animals have made some progress. Our dogs, for example, are more vocal than the wolves, for wild animals must not betray their presence to all and sundry, or their prey would escape them. Even the herbivorous animals are as quiet as possible, in order to avoid attracting the attention of carnivorous enemies.

Not all our utterances consist of words, and not all are intentional. If we burn or cut ourselves, or fall into the water, we utter some sort of *inarticulate* cry, and only then do we find fitting words.

The question must now be asked whether the sounds emitted by animals are voluntary or involuntary: that is, whether they are addressed to an auditor or whether they are simply emitted involuntarily. It is not easy to answer this question. However, it seems clear that by far the greater

number of animal sounds are of the same nature as our own involuntary sounds. Of such are the chirps of hungry nestlings, cries of rage, pain, etc.

The following examples may tell us something concerning voluntary communications:

Our dog wants to go out, but cannot himself open the door. At first he begins to scratch, and perhaps to whimper. If we take no notice of him we soon see that his desire becomes more impetuous, and if we grant it he runs off whisking his tail. A little later, when he wants to come in again, he scratches at the door and whimpers, or utters the very short barks that every dog-lover interprets correctly. The dog, therefore, has two means of communication at his disposal: sounds and gestures.

Another example: A goose wanders from her flock, and loses herself. She signals to it—that is, she stretches her neck into the air and calls, whereupon the flock answers. Now she begins to seek its whereabouts; she is soon able to localize the sound correctly, and a scene of mutual greeting follows. Now the birds' necks are not stretched upwards, but forwards, with serpentine movements. Here we have a deliberate communication, which serves and achieves a perfectly definite end.

The parrot also can make intentional communications—which does not, of course, imply that all the words he speaks have a meaning. Sometimes they are reeled off like a mechanical sound-record. But if he employs the word *cake* in a purposeful manner—that is, if he utters it in order to beg for cake, and makes it clear that he wants cake—then he has made a genuine communication.

Whether the animal makes a voluntary or involuntary communication, the final result is the same. Indeed, a young animal suddenly attacked by a robber will receive assistance from his parents, as a result of his *sudden* outcry, more promptly than if he were to hesitate, or perhaps have to consider what sort of a cry he ought to utter.

A considerable proportion of animal utterances are connected with certain gestures, or conversely, the gestures are usually accompanied by sounds. Here again we may ask the very question which confronted us when we came to consider animal sounds: Are the gestures of animals a voluntary or an involuntary means of expression? To give concrete examples—is the bristling of a dog's coat or a cat's tail, or the ruffling of plumage, as we see it in the hen, the turkey-cock, and many other birds, an intentional gesture, or are such forms of expression purely mechanical?

The question can be answered only by the systematic observation of the animal. We see our cat sitting on a garden wall or some other elevated perch. Then, at a certain distance, a dog appears. The cat arches her back, and her fur begins to bristle. This is the initial stage of a fighting attitude: one of the many silent gestures of the higher animals. Now the dog approaches, barking; and we see that the cat's fur is bristling more and more; she lifts her tail perpendicularly, and the tail too is bristling, while her ears—a sign of great anger—are depressed or laid back, and finally she hisses and spits (Plate 48).

Such a form of expression is intelligible to every-

body, to animals and human beings alike, and an enemy will think twice before attacking the irritated animal.—Meanwhile the dog has gone off again. The cat thereupon abandons her hostile attitude, for her anger has subsided. And now, when we take her up in our arms, she begins to purr contentedly.

What was really happening, for the time being, in the psychic life of the cat? First there was a sudden, violent inner excitement, which passed into the affect or emotion of anger. This anger flared up and then flickered out. Finally, it made way for a pleasure-toned, equable, unexcited frame of mind, and if we now stroke the cat this will continue to be her mood for as long as we caress her.

We should be unduly *anthropomorphizing* the animal if we assumed that the cat consciously adopted the bearing calculated to scare the agressor, thinking, perhaps: If I do so and so my enemy will be afraid of me and leave me alone. According to my observations, a kitten only twenty-five days old, if another kitten unexpectedly comes rushing past, already arches its back, and this gesture is made instantaneously, so that there can be no question of reflection or deliberation. Such actions, in fact, occur quite unconsciously, that is, instinctively, independently, so to speak, of the animal. Other animals, too, react to aggression as does the cat, and among them birds, such as brood-hens and owls, and even snakes and toads (Plate 49).

The cat has now begun to play; she is "dribbling" a woollen ball, and creeping after it with tense watchfulness, as though it were a mouse. Now she is wholly the beast of prey. Her face and her

Plate 47. What is it? Mako is photographed for the first time, and is greatly astonished by the camera.

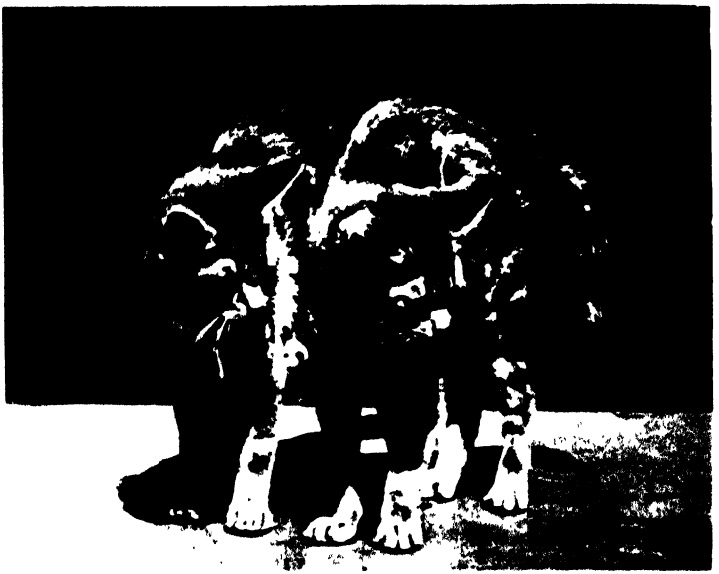

Plate 48. The Dog approaches. The excited kittens arch their backs and bristle their fur. The kitten nearer the source of danger is the more excited of the two.

Plate 49. Defensive posture of Short-eared Owl confronted by a Cat.

vigorous body are full of purpose, pointing towards this one object. We may observe this tense watchfulness in any predatory animal, but also, on occasion, in other animals, such as deer, monkeys, etc. It is always the same outward expression of inner concentration (Plates 47, 50, 51).

A comparison with human beings is obviously unavoidable. Just as in the animal, so in the human being—though in a nobler form, and with an incomparably greater power of variation—the *mimic expression* is involuntary. Whatever form of human expression occurs without intention, that is, involuntarily, as a reflex, whether we weep, or laugh, or rage, or ponder, or watch, these *outward forms* of the mimic and dramatic are always connected with psychic processes.

The *interpretation* of animal utterances and gestures is often very difficult, and can only be attempted in respect of a particular situation, with the aid of numerous observations and experiments. Not every gesture and utterance is as unequivocal as the gnashing of the teeth in a snarling dog. Here everybody knows what the dog is feeling.

For example, the motives which cause the dog to tuck his tail between his legs are of many kinds. In one case the motive may be fear or depression, as in a cold and hungry dog; in another it may be the tensest concentration (as when a dog catches sight of a "baiter").

Only too readily do we make the mistake of anthropomorphizing the animal; an unreliable proceeding, as it gives us a totally false picture of the animal psyche.

One considerable difficulty in the interpretation of animal speech resides in the fact that different animals may express two absolutely different internal processes or states of mind by the same sound or gesture; much as when we employ one and the same word for two different things—that is, when we use a word having two or more meanings. A very noteworthy example was furnished by my Grey Heron and some of his relations. The scolding of such herons may signify either hunger or excitement verging upon anger (page 49).

The language of the monkeys is perhaps the most difficult to interpret, as the individual species of monkey may express quite different emotional processes by the same sounds. It is the same with the mimic gestures of these animals; hence we must not without further consideration transfer to one species the impressions and experimental results obtained from another species.

However this may be, our higher animals have vocal sounds to express sensations and emotions of pleasure and pain, to utter their state of mind, and to give warning of danger; but none which can reveal to us their *intellectual* processes and contents. Their communications, whether they are purely instinctive—as they generally are—or deliberately expressed, refer only to the most vital necessities, to the preservation and maintenance of life. For the most elemental nature of the animal is psychical, not intellectual.

18

MARTEN, FOX, AND MONKEY COMPETE

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THE monkeys are the only animals which possess hands in the zoological sense of the word; that is, they have prehensile hands and are able to oppose the thumb and the great toe (or thumb of the foot) to the rest of the fingers and toes. By this means they are able to grasp objects or clasp a twig or bough.

In the lemurs, those born tree-climbers, the opposition of the thumb is more complete than in the true monkeys; and in the latter the thumbs and great toes are gradually degenerating—that is, becoming atrophied.

The performances of the monkey's hand are of course greatly inferior to those of the human hand; though technically it is superior to the fore-foot of any other animal. The mere act of lousing shows that even tiny insects and epidermal scales can be grasped with the thumb and forefinger. Moreover, the monkey's hand enables it to make use of implements—sticks, stones, utensils, etc.

I ask myself: Are the monkeys intellectually superior to the other animals? And if so, is it because they have hands and can do things which other animals cannot do? Further, one may ask: Could dogs and cats do what monkeys can do—

what the chimpanzee can do—if they were equipped with hands? Or conversely: What should we think of the monkeys' intellectual attainments if their fore limbs were constructed like those of the dog and cat?

These questions, of course, cannot be answered, for they relate to things which are neither actual nor possible. If no animal had hands it would be easier to draw intellectual comparisons between monkeys and other animals. As it is, we have to content ourselves with setting animals tasks to perform whose accomplishment is as little related as possible to the technical methods of the monkeys. Or there is another course: we can set the animal in question problems to solve which make little demand on technical skill. My marten, Pedi, and my Howler Monkey, Guapo, were given such problems to solve. They were two competitors.

Who is Pedi? A marten, a native of the Gran Chaco, who made the journey to Munich with Guapo, and has been with me about a month longer than the monkey. In the Gran Chaco he hunted, amongst other creatures, the so-called Golden Hare, an animal the size of a well-grown rabbit, and since he is a good tree-climber I expect he also hunted birds and took their nests. Like other martens, he has no objection to a vegetarian diet; he is especially fond of fruit, berries, and the roots of succulent vegetables. For the rest, he is a charming little animal, on intimate terms with everybody.

How could he compete with Guapo? This is how it was managed: I pushed a pole through the

meshes of the wire grille of a cage, and rested it, in a horizontal position, against the grill of the opposite side, so that a mere touch would cause it to fall. Thus, if an animal tried to get on to the perch the insecurely supported end would fall. I now asked myself whether the animal would push the pole into the meshes again? It was questionable, however, whether the marten was physically equal to the task.

First I put Guapo into the cage, placing him at some distance from the perch, in order to see whether this attracted him or not. The monkey climbed up the grille, clambered from the grille to the roof, anchored himself there with his tail, began to swing like a pendulum in the direction of the perch, and touched it with his hands: with the foreseen result, that the end of the perch was dislodged. Guapo now seized it in his hands, and within two minutes he had actually managed to fix it in its proper place, and was hanging from it by his tail. To my surprise, about five minutes later he pulled the end of the perch out of the grille, and then again inserted it. Apparently this game of alternately pulling it out and pushing it in gave him a great deal of pleasure, for he repeated this activity, not only the same day, but also later. I now pushed the pole through both grilles at a distance of about twelve inches from the floor, and Guapo applied himself in the same way to this easier task.

Now it was Pedi's turn. Strangely enough, he behaved exactly as Guapo had done, with the difference that this unusually playful and far more

agile creature worked much more rapidly. The fact that two animals so dissimilar in form and in other respects should have behaved in exactly the same way was really surprising.

Actually this result was of greater significance than might appear; and not only because it was achieved by different technical means, the monkey working with his hands and the marten with paws and teeth. What was so amazing in the solution of the problem was the spontaneous purposefulness and certainty with which the marten set to work.

My further experiments were in a region which Professor W. Köhler had explored some twenty years ago, on Teneriffe, with the aid of his chimpanzees. These chimpanzees, amongst other performances, dragged boxes into place in order to reach a basket of bananas hanging from the roof, and not directly accessible from the ground. And when the fruit was hung still higher they piled two, three, and four boxes on top of one another. In other cases they made use of a stick, which they climbed up, or used as a club or missile, in their efforts to reach the bananas. Subsequently similar experiments were made with the lower monkeys, and even with Capucins; the same results being obtained. My Macaques proved to have little capacity for the solution of difficult problems. They certainly did not pile up boxes in order to reach the desired fruit. But this is not at present the question at issue; for we want to discover what sort of problems can be solved both by monkeys and by animals of other species.

The two monkeys were in their cage. Outside the

cage a banana, which was tied to a string of bast, was so placed that the monkeys could not reach it directly with their hands, but could obtain it by pulling the bast, which ran up to the cage. This problem the monkeys solved without the slightest difficulty. They grasped the thread and immediately pulled the fruit towards them. The marten understood what was necessary just as quickly.

And now I put my foxes to the test. Fully ten years ago I had carried out some similar experiments with them; not with bananas, but with scraps of meat. For this purpose I cut a few hazel rods, sharpened one end of them, and got a second person to fix a piece of meat on the point while I held the other end. This excluded the possibility that the foxes might detect the scent of meat on the end which was turned towards them. I then pushed the rod through the grilles of the cage, so that it either lay flat on the ground or slanted upwards. In every case the dog-fox Caro solved the problem by using his teeth. He pulled the rod into the cage with a jerk, and tore the meat off the point. Once, when the rod caught in the meshes, owing to the presence of a lateral twig, Caro and Vixen tugged at the thick end together, and then greedily devoured the meat. I made in all fifteen such experiments, and then for a long time made no more. A few years ago, however, I resumed them in a modified form, tying the meat to a length of packthread instead of to a hazel-wand. The result was the same.

In a further experiment the Macaques had to fetch bananas from the roof of the cage. I hung up

a whole bunch, which I set swinging like a pendulum. The bananas were hung too high to be reached from the ground. However, the monkeys tried to reach them from the ground, and only when they saw that their efforts were in vain did they climb the grille, hold on to it with one hand, and pull down the bananas with the other.

Since the foxes could not easily climb the grille, the experiment was a failure in their case. But Pedi was a different proposition. He did not first try to reach the bananas from the ground, but immediately climbed up the grille, stretched himself out, holding on with the left paw and reaching for the fruit with the right.

For the monkeys the task of reaching the fruit should have been simple enough, as in the forest they often have to do such things. There must certainly be times when they grasp at fruit swinging to and fro in the wind. I was therefore all the more surprised at the marten's performance, as for him the whole situation must have been quite novel.

Guapo failed. He grasped at empty air once or twice, and then troubled himself no further about the bananas.

While speaking of this experiment I must record something that I once observed in connection with a female monkey ("Hexl," the meercat, who has already been mentioned) and also certain goats. I once fastened the monkey to a chain some 16 feet in length, and secured this to a tree. It was not long before she felt herself restricted in her movements. By running in a circle she had wound the chain several times round the tree. Suddenly she

Plate 50. There was always something gentle about the look and behaviour of this Short-eared Owl. She would always come on to my hand.

Plate 51. Simian expressions. Guapo is ill-tempered ; he growls ; he scolds ; finally he roars outright.

noticed the check on her movements, whereupon she ran round the tree in the reverse direction until the chain once more ran to nearly the normal distance from the tree. In freeing herself from what she felt to be an unpleasant situation she made no use of her hands.—Some time later, when I had fastened the monkey to a peg, the chain got entangled in a bush. This was a much more difficult situation; but she soon saw what had happened. This time she took the chain in her hands, and with great circumspection released herself. In this case it would have been impossible for her to free herself without using her hands. The problem was solved in proper monkey fashion; the animal acted with insight.

Tethered goats (one and two years of age) almost without exception wound themselves up to the post, and then tugged at the cord with disorderly movements. Sometimes they continued until their tongues were protruding from their mouths, so that I had quickly to come to the rescue. Now and again a goat would manage to unwind itself by accident, and there were older animals who were more experienced and more intelligent than the young, but I never saw a goat consciously and purposefully unwind its chain as the meercat did.

Looking back over these experiments, I note that in one case the marten equalled the performance of the Howler Monkey, and in another case did better. In further experiments Pedi was a match for the Macaques. (The goats were beaten by the meercat.) In the banana test to which both animals were subjected the Macaques (like the chimpanzees

which I have mentioned) were rivalled by the foxes. But in no case did foxes pile boxes on one another or make any use of implements. It is highly probable that quite apart from their bodily inaptitude for such performances they have not the necessary psychic aptitudes. (In the absence of adequate evidence this is not absolutely proven.)

There are, of course, actions for which the use of the hands is required, and these can be performed only by monkeys. Implements, however, are used only by a minority of species. Strangely enough, in the simian order there are only two groups of which we can really say that they make use of implements. These are, firstly, the anthropoid apes, such as the Chimpanzee, the Gorilla, and the Orang-utang—that is, the higher apes—and secondly, the Capucin monkeys of South America; a lower species, related to the Howler Monkeys. The Capucins make use of stones for cracking hard-shelled fruits and nuts, and will use a stick or similar implement in order to bring fruit within their reach. The Meercat-like monkeys—that is, the great majority—know nothing of the use of implements. It has still to be ascertained whether the use of implements by animals is innate—that is, whether in some cases we may regard it as an inherited habit. And suitable tests should be devised which would show whether in other respects the Capucins are more or less intelligent than the Meercats. Probably the result would be in the Meercats' favour.

Valuable and indispensable though our researches in the laboratory may be, they cannot by any

means claim to be the only way of approaching the mind of the animal. In the laboratory the higher animals, equipped with more sensitive nerves, or simply a keener sense of smell, feel confined and restricted. In the unaccustomed rooms, and before unfamiliar human beings, they suffer inhibitions which make it impossible for them to reveal the full extent of their abilities. And in the laboratory we cannot test the range of an animal's vision, or fix the limits of its ability to follow a scent; nor can we note the psychic manifestations connected with and accompanying such achievements of the senses.

We must not underestimate such voluntary and spontaneous achievements as lie outside the scheme of our experiments. They are often more original, and therefore more valuable, than the results of investigations which are vitiated by inexorable compulsion. Not infrequently the animal has to deal with things which it does not encounter in the world outside, and which it probably finds merely wearisome.

The *voluntary* activities of animals often lead to singular discoveries and inventions. We have only to see how they set about regaining their liberty. Here is an example: Mako and Java, merely in play, contrived to fix up a swing. The interesting point was the immediate exploitation of this involuntary invention (page 104).

Observations of the things that animals do of their own accord in everyday life are very important, and should be carefully followed; and it may even be possible to devise experiments without

causing the animal to be conscious of any inhibitions. When I speak of such voluntary performances I always have in mind an example which I must not forget to mention. The example is that of "Fox," a terrier of my acquaintance, who during the war daily and systematically travelled to Munich with his master, and was always regaled with scraps in the restaurants of the terminus. But when his master had to join up the dog made the journey alone, and returned of his own accord. Directly the starting signal was heard the dog became uneasy, left the house, which was not far from the Solln railway-station, ran off to catch the train, got into it with the rest of the passengers, jumped out again in Munich, and returned home by the usual train. Once, having left the train too soon, he lost his way, and did not return home for three days. When the people of the house learned of his independent journeys they saw to it that he made no more such excursions.

This performance is certainly worth recording, and deserves to be examined more closely. Ali showed me that dogs will quickly become familiar with various means of transport, and Fox was by no means the first dog to make independent journeys by rail. For him every journey ended with a "reward," a more copious meal than he was likely to get at home. The motive of this performance was the urge of hunger. The chain of associations—railway, restaurants, food—must have formed itself in his mind; and after his hunger was assuaged the other association—railway—master (or home) began to operate. His memory, of course, must have come

to his assistance; probably he saw this or that acquaintance among the passengers. Perhaps, too, the sense of time was operative with other factors.

In judging these cases we must not forget that a considerable degree of animal intelligence is necessary in such performances. It seems to us a simple and everyday matter that dogs should do such things. For example, if a chimpanzee or some other ape or monkey were to make the same journey, perhaps in a theatrical costume, and open the door for himself on boarding the train and alighting, we should assuredly regard such a traveller with a certain respect.

A great number of animals are fond of making discoveries, whether it is that they are naturally gifted in this respect, by reason of their way of life, or because we experimentally stimulate their curiosity. Pedi, the marten, is fond of creeping into burrows. For him an unlit stove and the flue-pipe represent such a burrow. In order to get into it he will open the door of the stove. He was not taught to do so; one day, probably, he found a stove door open. Having opened the door he squeezes into the stove, and, if it is accessible, into the flue. He is very fond of meddling with the grate of the copper, and he begins by clearing it of ashes, as it is then easier for him to creep into it.

I sometimes held out a piece of meat to one of my badgers, but instead of giving it to him directly I dropped it into a drawer, which I quickly closed. This at once became an excuse for him to open every drawer. I may mention that not only was part of the garden at the animal's disposal, but

also the whole house, apart from a few rooms. He rooted in the cellar as he rummaged in the loft, and since he was house-clean it was possible to let him have his own way.

He would open not only drawers but also a box with a hinged top; either with his teeth, or—and this was more usual—with his paws. Wolfie would open a blacking-box in the same way after he had once found in such a box a scrap of meat which I had placed there (Plates 52, 53). Not only animals, however, but also birds will eagerly perform such tricks.

For some years I have set my Corvidae (magpies, jackdaws, etc.), little tests of the following kind: In a glass cigarette-box, furnished with a brass lid, and also in an ordinary cigar-box, some titbit—a cherry, a plum, a piece of banana, or a scrap of cooked meat—is placed while the bird is looking. The lid is then closed, and the box is placed on the floor of the aviary. The glass box has a rather heavy lid, which projects over the glass except on the side of the hinge, so that it can easily be grasped by the bird's beak. On the other hand, the lid of the cigar-box is very light, but does not project, so that it cannot be grasped. The bird has to discover the little crevice which is visible along the front of the lid (but not along the ends, as these are sunk). It must not confuse this with the other three sides, or its efforts will be in vain. But once it has discovered the crevice it can raise the lid if it has the intelligence to do so (Plates 54–56).

All the birds turned to the glass box first. They could see the fruit in it, whereas that in the cigar-

box was invisible. Moreover, all the Corvidae, and especially the magpies, have a great affection for smooth and glistening objects. In this case the glass box with its brass lid may have been an additional attraction. First the rather despotically-inclined rook thrust himself forward. He lifted the lid high enough to thrust his head between the lid and the edge of the box, but found the position uncomfortable, as the heavy lid pressed on his head and imprisoned it. He therefore drew his head back, and the lid fell with a clank on the glass rim. Not in the least discouraged, he seized the lid again, but this time, instead of releasing it, he supported it, stepping a little to one side, until it could no longer fall, and then took the fruit in payment. All further experiments had the same result, even if repeated weeks later. The rook had learned by experience. On the other hand, he had great difficulty in opening the wooden box. He could not see the crevice, and hammered on the box violently and at random. Then the box fell open by chance, and the fruit fell out, and was eaten. It was only at the seventh attempt that the rook discovered the crevice, and after that he was able to raise the lid without difficulty.

Now the magpies were tested. They too, one by one, went to the glass box. First they ran round it, pecked at the fruit, and seized the lid; but as this fell noisily they flew away, startled. But they soon returned, inquisitive as magpies always are. They repeated this procedure four times, but they were undismayed, and the fifth time they lifted the lid to a suitable height, and even turned it back, so

that it could not fall to, and then picked out the fruit.

The jackdaw was a timid bird, and could not manage to deal with the box. Last year, however, I had another bird which acted like the rook, with equal success.

Then came the experiment with the cigar-box. One magpie began by running round it, but immediately saw the crevice, thrust his beak into it, and pulled out the fruit, although the lid pressed upon his head. Further tests had the same result; sometimes the bird pushed the lid back with his beak so far that it could not fall back. This was always done if the bird was no longer really hungry; in the first case it ate much more greedily.—The second magpie behaved in all respects like the first.

After these experiments I tested the Night Heron, whose interest in these proceedings had struck me for some time. I placed some scraps of fish and meat in the glass box, before his eyes, and showed him several times how the box opened and closed; whereupon he flew straight at the goal, pecked at the food from outside the box, and ran round it again and again, but did not know what he ought to do next, even when I repeated the experiment during the next few days. Undoubtedly this bird is technically capable of seizing and lifting the lid, for his beak is even longer and more powerful than that of the Corvidae; but he can only seize things in it—as when catching fish—and is incapable of the delicacy with which the magpie, for example, drags little insects out of their hiding-place, or seizes tiny fragments of some moth or butterfly.

Plate 52. There is cold meat in the box. Will "Wolfie" have the intelligence to lift the lid.

Plate 53. He opens the box without more ado and obtains his reward.

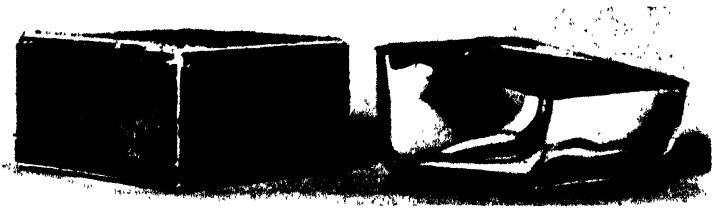

Plate 54. Which of my birds will manage to open these boxes?

Plate 55. The Magpie needed no teaching.

Plate 56. The Night Heron's beak would enable him to lift the lid, but he is not intelligent enough.

But quite apart from this, he is far less intelligent than the Corvidae. He was perfectly conscious of the goal, but the ways and means of reaching it were beyond him.

These various examples of animal behaviour show a considerable degree of intelligence and purposeful action.

Animals are not machines, as was once believed, but neither are they rational beings. We cannot deny that they display a primitive degree of intelligence; but we cannot credit them with any higher intellectual faculties. They have as much intelligence as they need for their mode of life. Each is in its way complete. While some have developed greater intelligence, others are distinguished by more infallible instincts.

19

CONCLUSIONS

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We have reviewed a surprising variety of psychic faculties, of internal processes, of strange urges and instincts, and also of curious habits and remarkable achievements. In addition to psychic behaviour which seems to us as though stereotyped, we find strongly-marked individualities, if not animal personalities.

We have seen that even in a tiny chicken urges or impulses and instincts are at work, but we do not know what impulse and instinct really are. Even in the egg the urge towards freedom is operating. The bird raps at the walls of its prison and breaks them. Must we not perceive in this process an archetypal psychic impulse, binding upon all animal life, when we see that all animal life, from the tinest of living creatures, visible only in the microscope, to the largest, cannot endure restraint—that worm and spider, cockchafer and fish, frog and snake, starling and mouse seek with all their might to escape from our hand if we attempt to hold them?

We have seen various animals at play, each in accordance with its own nature, its own mode of life, its physical structure; but we do not know why they play. We can imagine a world in which animals would not play, in which they would all be silent. Indeed, quite a number of them are

silent, and even where a vocal mechanism exists many of them make use of it only in extremest necessity. And how is it that the bird in the egg is able to converse with its absolutely unknown mother—that dark, warm, comforting mass above it—and respond to her call, or be silent when silence is demanded? How can the mother understand her offspring when she has never before hatched an egg? We speak of reflexes or instincts, and do not reflect that by such clichés the problem is not solved, but only translated. We do not even know what life is, to say nothing of psychic life, or how the instincts have arisen. Every attempt to explain the evolution of the instincts has hitherto led to error and contradiction. And if now and again someone believes that he has unveiled the mystery of instinct, we may be sure that he has not even understood the nature of the problem, and has not realized that here we are dealing with things that lie beyond human knowledge.

As various passages in this book will have shown, I have discriminated between urge or impulse and instinct. To feel an urge or impulse means to be subject to a compulsion. Our daily appetite for food is such an urge. All other urges are equally unequivocal. We can speak of the sexual urge, the migratory urge, the play impulse.

Impulse comes before instinct. For example, the nest-building of our birds, in its incredibly manifold forms, reveals itself as an expression of the sexual impulse, and the web of the spider as an expression of the urge to secure nourishment. In other words, the procreative urge of the bird is unequivocal; the

male seeks a female, and then, before or after the pairing, a nest is built. So far all is done in obedience to the urge. But the manner in which the nest is built depends almost wholly on instinct. The nest may assume any one of a thousand forms; it may be extremely simple or highly complicated, and all kinds of material may be used in its construction. Think of the little hollow and the few bits of grass that content the skylark, or the sparrow's untidy nest; and then of the artistic structures of our finches and long-tailed tits.

The same may be said of the spider's web. The spider cannot obtain food unless she constructs a web. But these webs differ from one another as greatly as the nests of the birds. Here too we see the greatest variety of form, from the simplest fabric to the artistic achievement of the Epeira. But the manner in which the spider fixes and weaves her web is due to the operation of instinct. In both cases we see one unequivocal urge and many forms of instinct.

However, the instincts of the birds and mammals are not so inflexibly rigid as those of the insects; on the contrary, in all the higher animals they appear to be considerably relaxed. While the waxen cell of the bee absolutely must be hexagonal, the nest of a warbler or other bird may vary greatly in form and building material, and may contain even human products, such as cloth, string, etc. Further, the life of the higher animal is very much freer than that of the insect, which is caught and held in the mechanism of the instincts.

That animals of greater and less capacity should

be described in this book is not surprising. What is astonishing is the unintelligible nature of their actions. For myself, I marvel at every faculty of the animal which I do not myself possess, and which evades my grasp; that is, the instinctive faculties, and all that lies beyond the operation of my own senses, as the sight of the falcon or the sense of locality possessed by many animals (as Max and Nora), and their purposeful behaviour when confronted with perilous situations. It is almost paradoxical that one should set a dog upon a scent and yet have no notion of the nature of its gift. The experimenter is constantly surprised to find that the animal often decides otherwise than he expected. In this respect animals are often incalculable, as I have learned from my years of experience with my monkeys.

I do not wonder so greatly at the purely intellectual performances of the animal, as compared with its often surprising powers of memory. We ourselves possess intellect in a different degree, and higher senses, so that if we think accurately and honestly we shall not be so greatly impressed by such performances.

That animals are *animate* creatures is to-day very widely recognized. And we may justly credit a few of the higher animals with intelligent behaviour. This presupposes *consciousness*. There are, however, animal psychologists who credit all the higher animals (that is, the vertebrates) with a consciousness, but not the lower animals. Many experts even include bees, ants, etc., in this category. And why not, if we are consistent? Ought we really

to regard the goldfish, for example—whose whole behaviour seems to reveal it as a rather stupid creature—with all its relatives, as standing on a higher psychological level than the busy ant, with its predominantly psychic attainments? By no means! On the contrary, the psychic attainments of this insect are superior to those of many reptiles. Such questions make us pause and reflect, because we are obliged to realize that no conclusions as to psychic capacities can be drawn from the structure of the brain or the formation of the nervous system. There are other psychic faculties of the animal which as a general thing touch us more closely and move us more strongly than those which may properly be called intelligent. They are the faculties related to the emotional life of the animal—to its will and its desires. I think, for example, of Guapo's need of physical contacts and caresses. Is it possible, as I have hinted, that he thinks we are creatures of his own sort, and unconsciously seeks an echo in us?—I think of Ali's geniality to nearly all his housemates. One could almost believe that he had some power of intuition which enabled him to understand the characters of his heterogeneous brothers and sisters. Even the fierce uncontrollable Java and the incalculable, and, humanly speaking, rather idiotic Mako are on friendly terms with Ali!

In strong contrast to the varied and active emotional life of the poultry-run we have the psychic enervation of the quails in the bay window.

Old habits, which are frequently encountered among my animals, seem to bind them together rather than divide them. Each animal is faithful

to its own kind, but many are amiable to all. Anything unusual attracts attention at once, and is discovered and published first of all by the magpies. They begin to chatter immediately if there is discord and strife in any of the cages.

Curiously enough, even enemies are ready to help each other if the former opponent is attacked by a third party. In this case he can rely with certainty on the help of his former enemy. If anyone appears to be striking me all the animals are on my side; if I seem to strike one of the animals, then all, with the exception of Ali, are against me. The solidarity of the animals against even a human friend is at first surprising, but it would seem to be the natural thing.

All my animals, including those which I have not mentioned here, are types, and—like all animals ultimately—are largely inscrutable. The animal is another creature; it is *different.* The farther it is removed from us in structure, the more indistinct are its psychic qualities, and the more unintelligible does it appear to us.

There are myriads of little souls in the animal kingdom, each with its appointed existence, each a world to itself, and yet standing in relation to other little souls in its environment. Is there not something magnificent in this vast alien world? Many of us, alas! have lost all feeling and reverence for it, and we have almost forgotten what wisdom is, in the highest and most primitive sense of the word.

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